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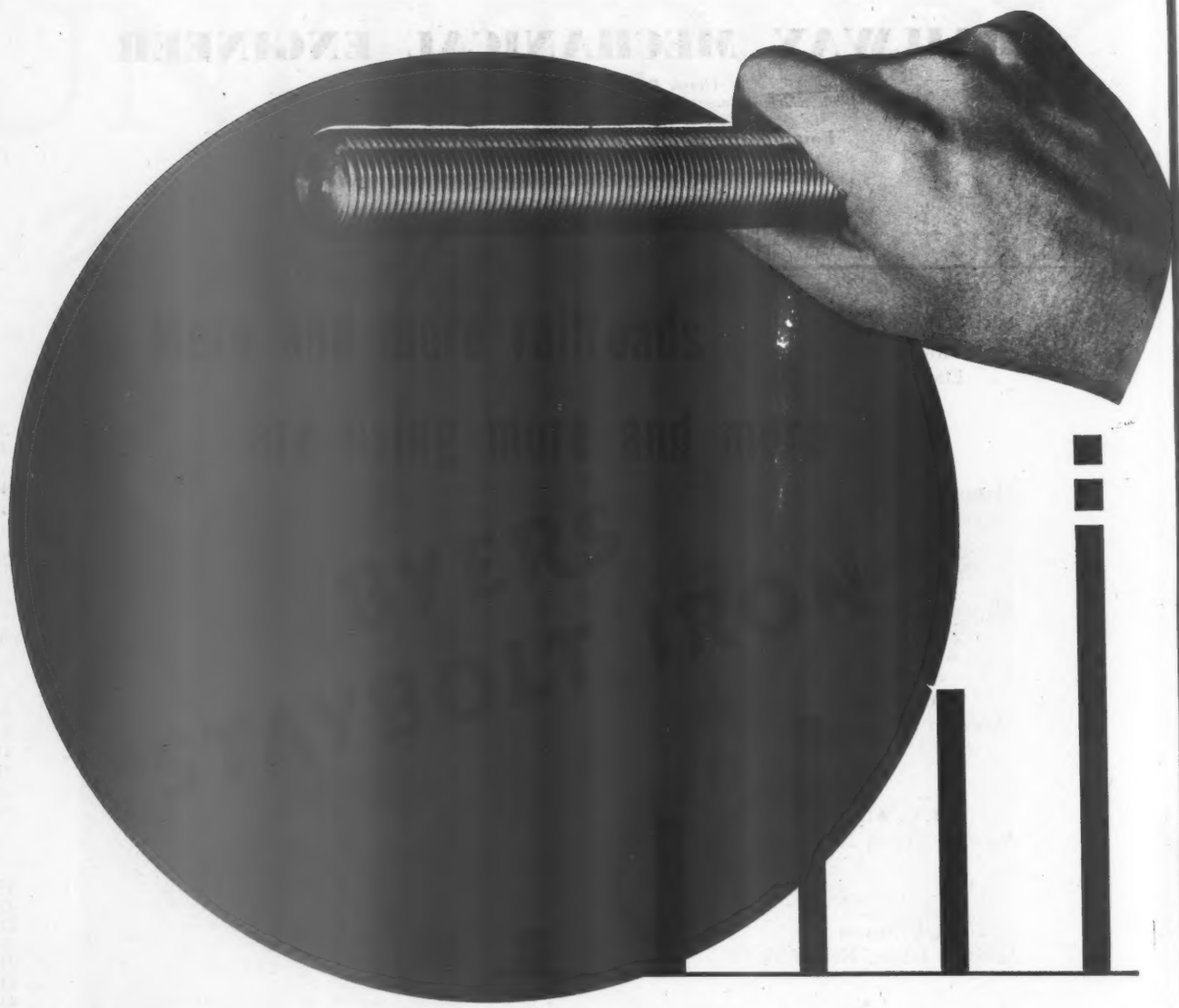

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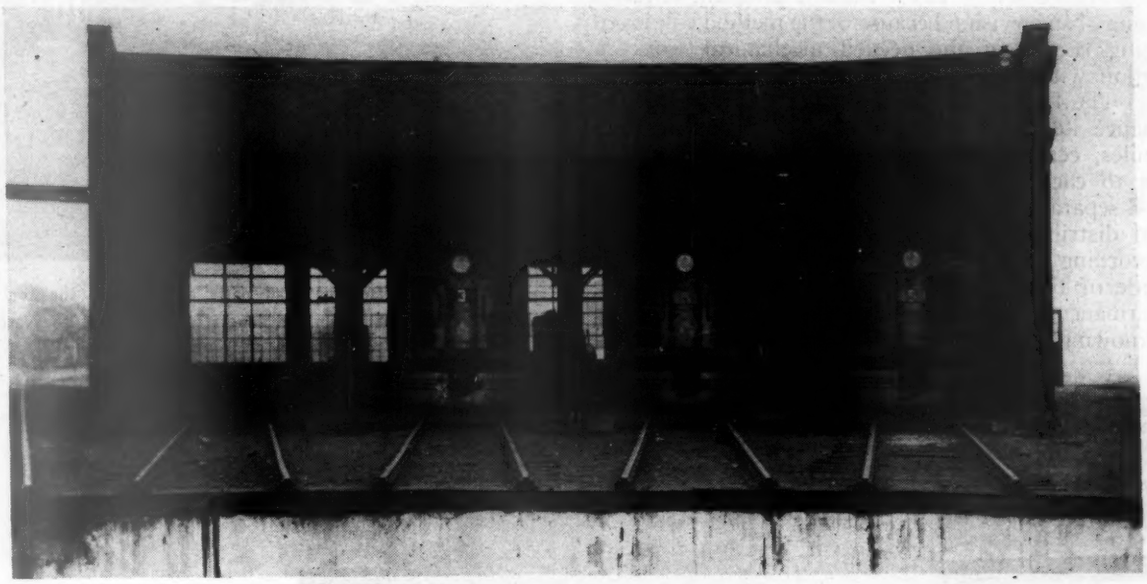
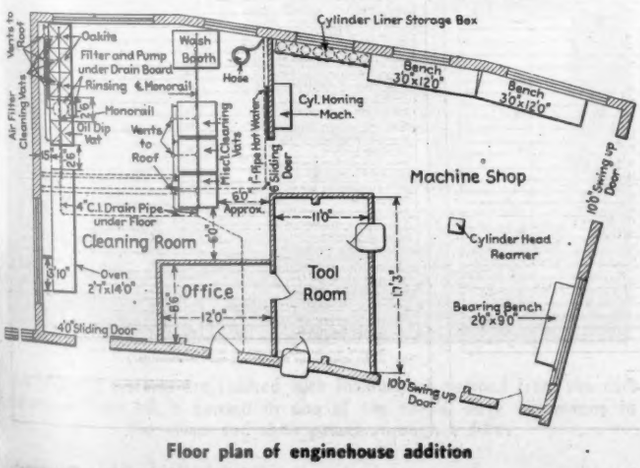


Baltimore & Ohio Equips Enginehouse for

Maintaining Freight Diesels

Six hours in three days required to keep locomotives serviced on a 1,200 mile round trip - - Maintenance schedule insures proper attention for all parts

When the Baltimore & Ohio first placed Diesel-electric freight locomotives in service, it was realized that maintenance facilities adequate for speedy but complete servicing would be required if full advantage was to be taken of the high availability factor of this type of power. At the present time two long turn-around freight runs are being regularly operated with Diesel-electric locomotives. These runs are between Willard, Ohio, and Philadelphia, Pa.; and Cumberland, Md., and Washington, Ind. The run between Willard and Philadelphia is 1,216 miles for the round trip and locomotives assigned to this service make the trip once in every three days. Maintenance operations are performed at Willard and the time allowance for such work is six hours on every third day; the locomotive arrives at about 9 a. m. and is dispatched at 3 p. m. At Philadelphia the locomotives receive only fueling, sanding, lubricating, and watering attention, with occasional emergency adjustments.



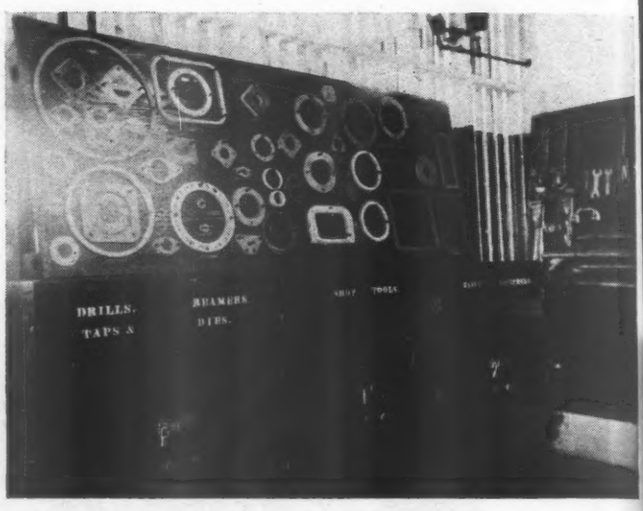
Floor plan of enginehouse addition

The facilities devoted to Diesel maintenance at Willard consist of a separate four-stall section of the enginehouse, onto which has been built a shop addition with necessary work benches, cleaning vats, ovens, a store room, and a foreman's office. This addition was built of concrete blocks with one wall almost solidly built of glass bricks. The shop is heated by a hot-air system employing forced ventilation.

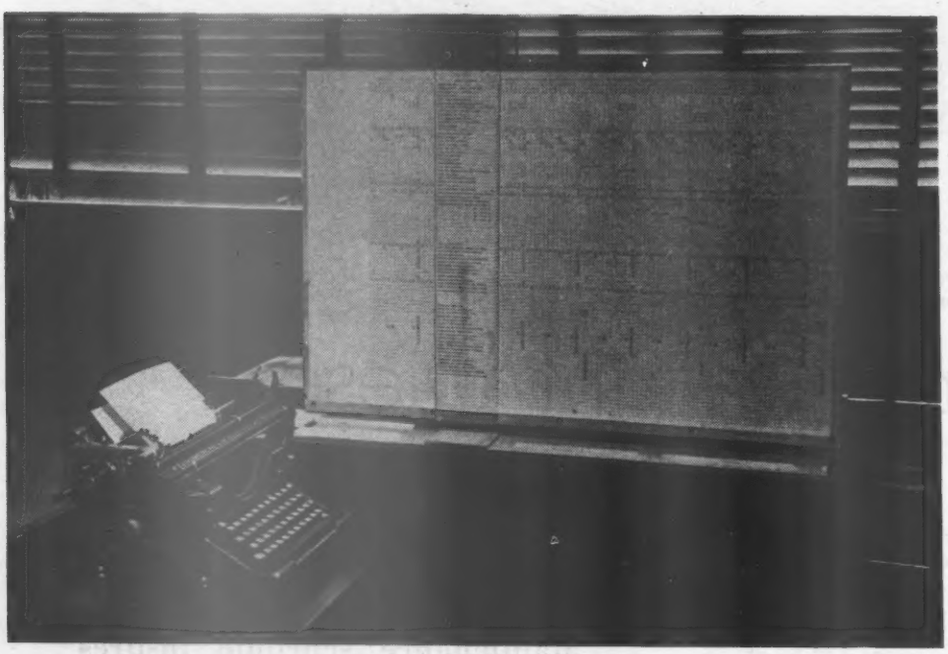
Three of the working tracks are equipped with drop tables for use in the removal and application of wheels and traction motors. Each track is long enough to accommodate two units or half of a 5,400-hp. locomotive.

Running Maintenance System

The so-called running-maintenance system is employed on the Baltimore & Ohio in keeping Diesel locomotives available for service. Such a program requires a minimum of supervision because of the method employed in keeping record of the needed mechanical work in conjunction with the mileage accumulated by the locomotives. The B. & O. has elected to break down needed maintenance items on a 100,000-mile cycle. For each 1,000 miles, certain mechanical and electrical attention is given to each locomotive. A master control chart listing 88 separate items of maintenance has been broken down to distribute the various jobs over the mileage table according to the frequency of need for attention, magnitude of the work project, and time available for its performance. It is possible by the use of the master chart, knowing the accumulated mileage of the loco-



Gaskets and miscellaneous small parts are kept in the tool room—Stocks are replenished from the general storehouse as they are needed



Eighty-eight separate items of maintenance are charted on a mileage basis—Clerks prepare required work forms for the shop forces as locomotives reach the shop for maintenance attention

Below: Typical work assignment sheet prepared for the use of the Diesel foreman—Items of maintenance are set up according to the accumulated mileage of the locomotive units

DIESEL MAINTENANCE REPORT (1)

Mileage Covered ____ Date ____ Diesel No. ____

TYPES OF MAINTENANCE	No.	UNIT Work Required Sign for Item	UNIT Work Required Sign for Item
Inspect leg, deck	1	Due	Due
Inspect pistons, liners & crank case	2	Due	Due
Check lube oil for dilution	3	Due	Due
Check all belts	4		
Check entire cooling system	5		
Check injector timing & rack setting	6		
Check supercharged trip engine & traction motor blowers	7		
Check pilot valve setting & linkage	8		
Check operation fan clutch	9		
Check emergency fuel cutoff	10		
Check belts & mte-entire engine	11		
Check all gauges	12		
Clean engine air filters	13		
Clean engine room air filters	14		
Clean air compressor filters	15		
Clean engine air box	16		
Clean lube oil breathers	17		
Clean oil separators	18		
Tighten oil coolers	19		
Flush cooling system	20		
Flush load regulator & governor	21		
Renew air compressor h.p. unloading diaphragm	22		
Drain fuel pumps	23		
Remove & inspect main bearings Nos. 1&8	24		
" " " " " Nos. 3&6	25		
" " " " " Nos. 5&6	26		
" " " " " Nos. 7&8	27		
" " " " " Nos. 9&10	28		
Remove & inspect rod bearings Nos. 1&2	29		
" " " " " 3&4	30		
" " " " " 5&6	31		
" " " " " 7&8	32		

RECORD OF OIL CHANGE

CHANGE OIL AT MILEAGE SHOWN (Change Nicholson Filters) (Clean Lube Oil Strainer)		

DIESEL MAINTENANCE REPORT (2)

Mileage Covered ____ Date ____ Diesel No. ____

TYPES OF MAINTENANCE	No.	UNIT Work Required Sign for Item	UNIT Work Required Sign for Item
Lube air test of all pistons	33	Due	Due
Tighten cylinder head crab nuts	34	"	
Check traction motor gears & lubrication	35	Due	Due
Fill engine water pump oil cups	36		
Drain air recv. inter-cool & cont. air filtr.	37	Due	Due
Clean & inspect control air filters	38	"	
Renew air compress or L.P. unloaded diaphragm	39		
Change nicholson filters (lube oil)	40		
Clean lube oil strainers	41		
	42		
Check F. C. S. switch	43		
Check traction motor suspension bearing oil level	44	Due	Due
Check battery water level & gravity	45	"	
Wash out battery boxes	46		
Check & clean tr. motors & main generators	47		
Inspect & clean all electrical cabinets	48		
Check electrical system for grounds	49		
Check operation of all alarm circuits	50		
Check auxiliary generator voltage	51		
Inspect speed governor	52		
Inspect all control station	53		
Check traction motor & main generator brushes	54	Due	Due
Clean & paint all exposed wiring & cables	55		
Oil electro-pneumatic gov. control cylinders	56		
Oil speed recorder	57		
Lubricate speed governor	58		
Check & clean aux. gener. Pull pump motor Motor-generator set & load regulator	59		

Monthly Form Due _____

Quarterly Form Due _____

DIESEL MAINTENANCE REPORT (3)

Mileage Covered ____ Date ____ Diesel No. ____

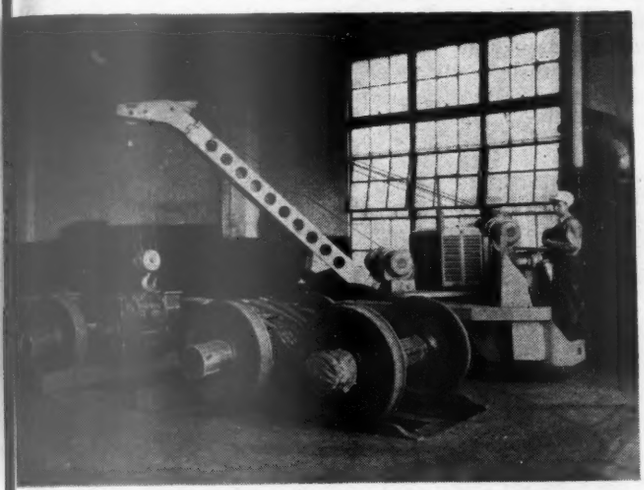
TYPES OF MAINTENANCE	No.	UNIT Work Required Sign for Item	UNIT Work Required Sign for Item
Change air compressor oil	60		
Change fan drive gear box oil	61		
Change engine governor oil & flush	62		
Grease brake blower bearings	63		
Oil truck center bearings	64		
Oil fan clutch pins & rollers	65		
Grease engine governor & shutter linkage	66		
Check oil level in journal boxes	67		
Grease diaphragm centering device	68		
Grease cooling fans & fan idler	69		
Grease flood coupler	70		
Grease clutch pilot & thrust bearing	71		
Grease traction motor blower bearings	72		
Grease fair couplings	73		
Oil voltage regulator	74		
Grease main generator bearings	75		
Lubricate reverser drum segments	76		
Oil electro-pneumatic governor control	77		
Oil power & starting control bearing	78		
Grease reverser bearings & gear teeth	79		
Check emergency equipment including Fire extgr.	80	Due	Due
Check engine governor oil level	81	Due	Due
Air test of air brake equipment	82	Due	Due
Inspect running gear, all trucks; all safety appliances, couplers & draft gear	83	Due	Due
Check air compressor oil level	84	Due	Due
Check engine lube oil level	85	Due	Due
Test steam generator & all safety appliances	86	Due	Due
Clean Full Flo & duplex fuel filters	87		
Clean Nicholson fuel filters	88		

The above work has been performed and the report is approved: Any items marked "Due" and not signed for are Dispatching Foreman's Responsibility.

Dispatching Foreman

motive, to prepare a required work sheet within a few minutes. This sheet, prepared by an office clerk, is furnished to the Diesel-electric foreman prior to the arrival of a locomotive and he is able to estimate the labor force which he must employ to finish the work within the six-hour turning time generally available.

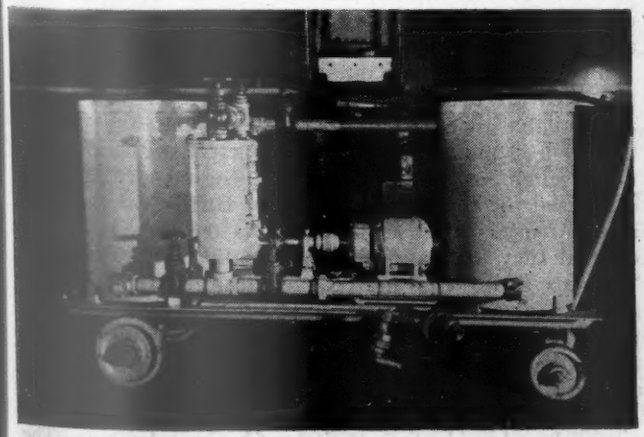
As each item of work is completed, the responsible workman signs for its performance and the Diesel electric foreman signs the entire form with the understanding that any items marked "Due" and not signed for are his responsibility. When the maintenance report is



A five-ton crane truck is the only lifting facility in the shop

returned to the general foreman's or master mechanic's office, any items of incompleted work are transferred to a deferred maintenance sheet and these items are, in turn, placed on the next work sheet for the particular locomotive and are marked "Over-due." This system has been found to be not only simple in operation, but most effective in insuring the performance of all required maintenance work according to the mileage tables set up for maintenance and overhaul attention.

In addition to the locomotive maintenance form, the Diesel foreman is required to file a daily report of work performed in the shop, listing parts removed, bearings examined or renewed, oil and filter element changes, wheel changes, motor and generator changes, any periodic tests and inspections, and other miscellaneous work found necessary. A card record is kept of parts removed,



Lubricating systems are flushed with flushing oil pumped from the cart shown—Clean oil is carried in one of the tanks, dirty oil returns to the other and then passes through a filter

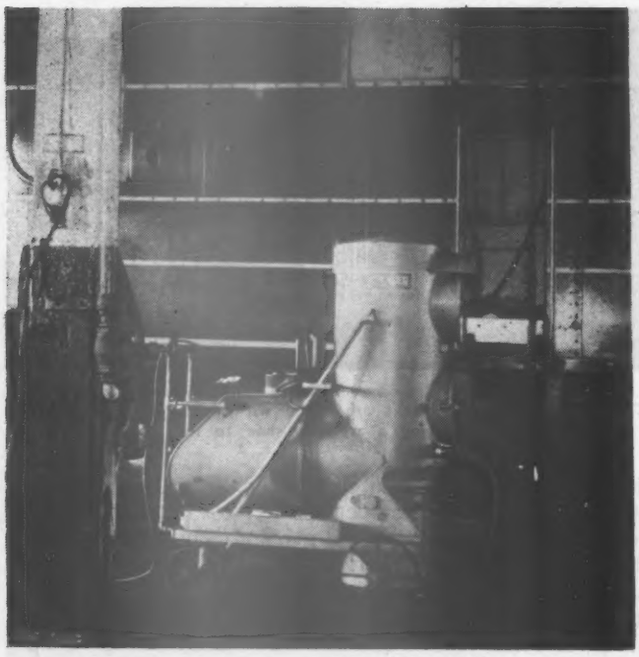
Three of the working tracks are fitted with drop tables—Workmen shown here are applying a wearing shoe to the pedestal liner

overhauled, and replaced in a locomotive. This record is kept by the serial number of the part, each listed on a separate card, and the record gives a complete history of the service life of the particular part showing the locomotives on which it has been applied; the unit number; its position, if a cylinder liner, head, etc.; the mileage made, and the reason for removal. Lubricating-oil figures are accumulated for each locomotive unit, showing when, where, and how much oil is added, together with a mileage record and the reason for any oil additions.

Servicing Operations

With only six hours to prepare locomotives prior to their dispatchment upon another roundtrip run, there is little time lost in performing the necessary supply, maintenance and repair operations. Locomotives coming from the freight yard run onto the enginehouse lead track where they are refueled, watered and have the sand boxes filled. The locomotive is then split into units

Cylinder liners are honed with this electric-driven tool—The honing unit consists of two carborundum and two felt pads mounted in a holder which rotates at 550 r.p.m.



An industrial-type vacuum cleaner is employed to clear dirt and cinders from grilles and air passages

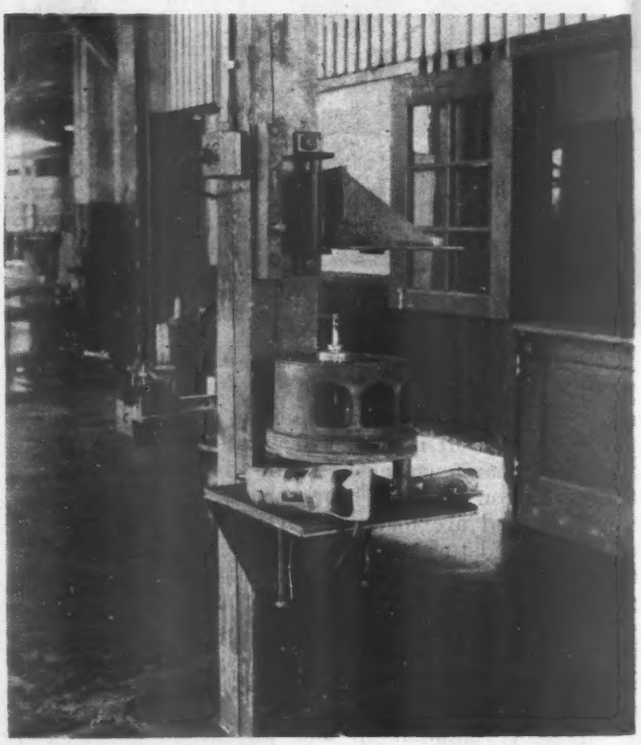
with each being run onto the enginehouse turntable and placed in its stall in the Diesel section of the enginehouse. A force of cleaners goes to work immediately, washing the exterior of the locomotive and thoroughly cleaning the interior. At the same time the lubricating-oil system is filled up, necessary attention given to running and draft gears, and the signal and control systems checked. Mechanics and helpers, using the required work report, give special attention to those items marked "Due" on the sheet, testing and removing parts as indicated.

Parts Repair

Routine parts maintenance at the Willard shop is largely confined to reconditioning of cylinder liners, cylinder-head assemblies and connecting rods and bearings, with the repair of water pumps, fan assemblies and lubricating-oil pumps representing a comparatively small part of the work. In addition, the cleaning and renewal of filters and filter elements is carried on in considerable volume.

Cylinder liners, after being vat-cleaned, are honed with a four-way hone driven by an electric motor operating at a speed of 550 r.p.m. The honing device consists of two carborundum pads and two felt pads. The entire unit is installed in a guide frame and is counterweighted to facilitate its use. An adjustable stop limits the upward movement of the honing tool assembly so that the hone remains inside the liner while work is in progress. The stand has a removable pan at the base to catch the oil used during the honing operation.

Cylinder heads are also vat-cleaned and then prepared for reapplication to locomotives with a careful reaming of the inside and outside valve seats. The necessary reamers are employed in an electrically driven motor and are fitted over a pilot which insures absolute accuracy in the finished surfaces. The reaming stones used are first faced off to the proper angle with a diamond point tool. The valve-stem guide is cleaned with a scraping-type reamer. Valves are applied to the heads by selective fitting. All head assemblies are built up with reconditioned or new valve springs and bridges with proper adjustments being made for tension and height.



Valve seats are refaced and other cylinder-head work done on this table

Scavenger oil pump in the foreground pumps used crankcase oil to a storage tank—The lubricating-oil pump is installed against the building wall

The cleaning room contains the vats already referred to which are used in the removal of grease, carbon and accumulated dirt from the various engine parts. There is also a cleaning vat, containing a caustic solution, in which engine-room air filters and engine air filters are immersed for the removal of dirt. Brillo is the filtering medium used in these filters and after they have been cleaned they are saturated in a tank of lubricating oil. They are then placed in ovens for draining. These ovens are kept at a temperature of 180 deg. F. and this temperature is sufficiently high to insure thorough drainage although a protective dust-collecting film of oil remains on the filtering mesh.

Lubricating-oil filters are returned to service after the removal and replacement of the filtering element. The filter cage is cleaned in the caustic vat before the new filtering medium is placed in it.

(Continued on page 398)

Burlington's

Aluminum Hopper Car

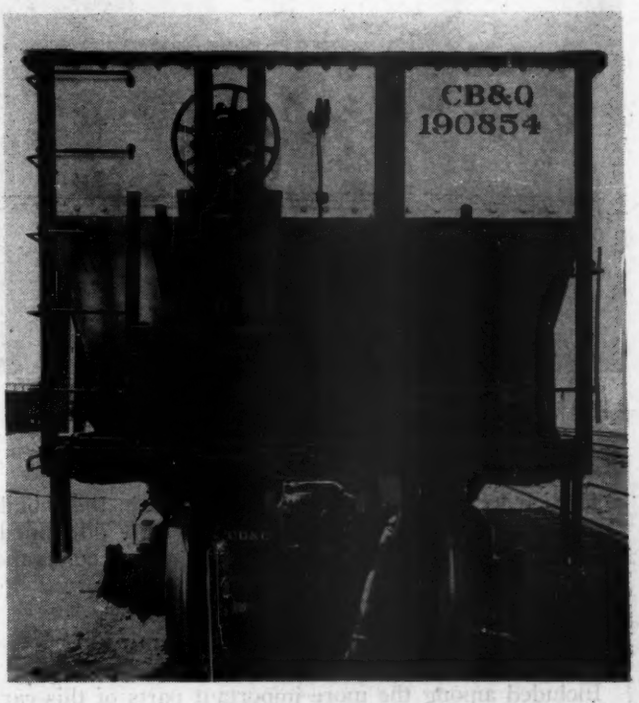
Hopper car rebuilt by railroad makes use of strong aluminum alloys to replace steel parts that come in contact with load

THE Chicago, Burlington & Quincy has recently reconstructed at its Havelock, Neb., car shops a 55-ton hopper car in which the original steel underframe and steel superstructure frame are retained, but all parts of the car subject to contact with the lading are made of strong aluminum alloys. The car weighs 4 tons, or about 18 per cent, less than conventional steel hopper cars of this size.

But four tons of additional load can be carried without exceeding specified A.A.R. axle loads, or requiring more drawbar pull. This car will be used primarily in transporting high-sulphur coal from Southern Illinois mines and one of the main objectives in building the car was to see if the aluminum parts will demonstrate the anticipated substantial increase of life in this exceptionally severe service.

Rebuilt Car Weighs 36,800 Lb.

The original car, with a rated capacity of 55 tons and a load limit of a little over 62 tons, weighed 44,700 lb., empty. As rebuilt, the light weight of the car is 36,800 lb. and the load limit 66 tons. Besides using aluminum



End view of the car

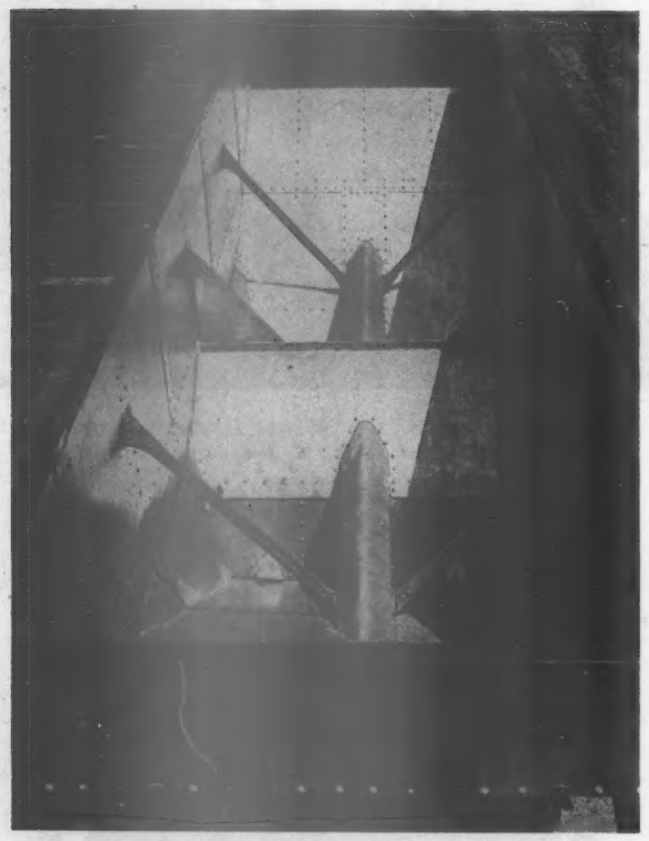
to reduce the car weight, Pittsburgh tubular axles are installed which weigh 840 lb. less than solid axles. The multiple-wear steel wheels, however, weigh more than the wheels replaced, (43 lb. per wheel), so there is a net decrease of only about 500 lb. in car weight as a result of using steel wheels in combination with the hollow axles. The total weight saving as a result of the aluminum con-

struction is estimated to be 8,431 lb., but AB brakes are installed and other details which add to the weight, so that the net decrease in light weight of the car is 7,931 lb., or approximately 4 tons as stated.

Black Paint Identifies Old Parts

All aluminum plates to be formed are Alcoa Specification 61-SO, heat treated to 61-ST. Plates rolled and not formed are Specification 52-S. Bars are Specification 17-ST.

All rivets through aluminum sheet are of aluminum. The hopper doors and chutes are aluminum, but the original steel door fixtures and fastenings are used. Referring to the illustration, other parts of the original



The interior surfaces of the Burlington hopper car are all aluminum

car which were made of steel and retained in the rebuilt car are painted black and can be readily identified, aluminum parts being shown in their original color and with no surface treatment or protection.

Detail Car Parts Made of Aluminum

Included among the more important parts of this car, made of aluminum are the bottom side sheets, upper side sheets, end side sheets and end sheet, ¼ in.; hopper doors, ⅜ in.; outside hopper sheets, inside hopper sheets and longitudinal hood sheets, 5/16 in.; end floor sheets, 1.4 in.; side floor sheets, 5/16 in.; side sheet intermediate and bolster splices, 1.4 in.; ballast deflectors, 1.4 in.; inside brace bars, 1 in. by 3½ in. by 6 ft. 1 in.; bulkhead braces ⅜ in. by 3½ in. by 4 ft. 2 in.; crosshead hood sheets, 5/16 in.; all gussets and stiffeners 5/16 in. A total of 250 lb. of aluminum rivets are used in the car.

B. & O. Enginehouse for Maintaining Freight Diesels

(*Continued from page 396*)

In addition to the electric motors required for the cylinder liner and head operations and the requisite hand tools common to repair shops, comparatively little other equipment is required to carry out the maintenance program at the shop. A large-capacity vacuum cleaner is employed to clean out air passageways and radiators and to remove cinder accumulations from pockets. A high potential electric testing device is used in making the required Federal test of wiring and installation. There is a high-pressure lubricator for greasing traction motors.

Serial No. _____

Loco.	Unit No.	Position	DATE Inst.	DATE Rem.	Mileage Made	Reason for Removal

Parts record card used to assemble performance data

An Ashcroft No. 1300 gauge tester serves in testing all gauges which must normally be checked, such as the lubricating oil pressure and the air pressure gauges.

Lubricating oil drained from crankcases is forced by a scavenger oil pump into a storage tank from which it is later removed and shipped to the oil-reclamation plant of the railroad located at the Mt. Clare shop in Baltimore, Md. A Bowser lubricating-oil pump furnishes the supply of new oil to outlets located at each of the engine locations. Crankcase flushing and cleaning is done with a railroad-built unit which uses a centrifugal pump to force flushing oil through a line into the crankcase. This oil, after passing through the crankcase, is returned to another tank on the "flush-cart" and passes from this dirty-oil tank through a filter and then to the clean-oil tank for recirculating.

Inasmuch as no engines are removed from locomotives at Willard, the shop is not equipped with any overhead crane facility. A Yale & Towne five-ton capacity Cam-O-Track extensible boom hoist serves adequately to handle traction-motor wheel assemblies and other parts that are too heavy to be moved from place to place in the shop by hand.

A movable working stage with steps at each end is placed against engine door openings for the convenience of workmen. Shelves built on this platform are used to hold tools and parts required by the workmen. This feature has been helpful in reducing travel time between the working spot and the tool-room or store-room.

Similar working procedures are used at Cumberland, Md., in maintaining the locomotives in the Cumberland-Washington, Ind., service. The shop facilities employed are those also used in maintaining gas-electric rail cars.

Dynamometer

Tests of Type E Booster

This type operates up to 35 m.p.h. and may be cut in at speeds up to 15 to 22 m.p.h. —Steam consumption averages between 19 and 20 lb. per i.hp.

IN STEAM locomotive operation the need for auxiliary power at critical moments was long recognized and led to the development and application of the Locomotive Booster, which provides additional drawbar pull not only for starting, but also for negotiating heavy grades and meeting other intermittent demands which require auxiliary locomotive drawbar pull.

Several thousand Locomotive Boosters have been applied to locomotives on many roads so that supplementary power would be available to meet the operating requirements. These applications have been made to freight, passenger and switching types of locomotives and the Franklin Locomotive Booster has made it possible to handle heavier trains.

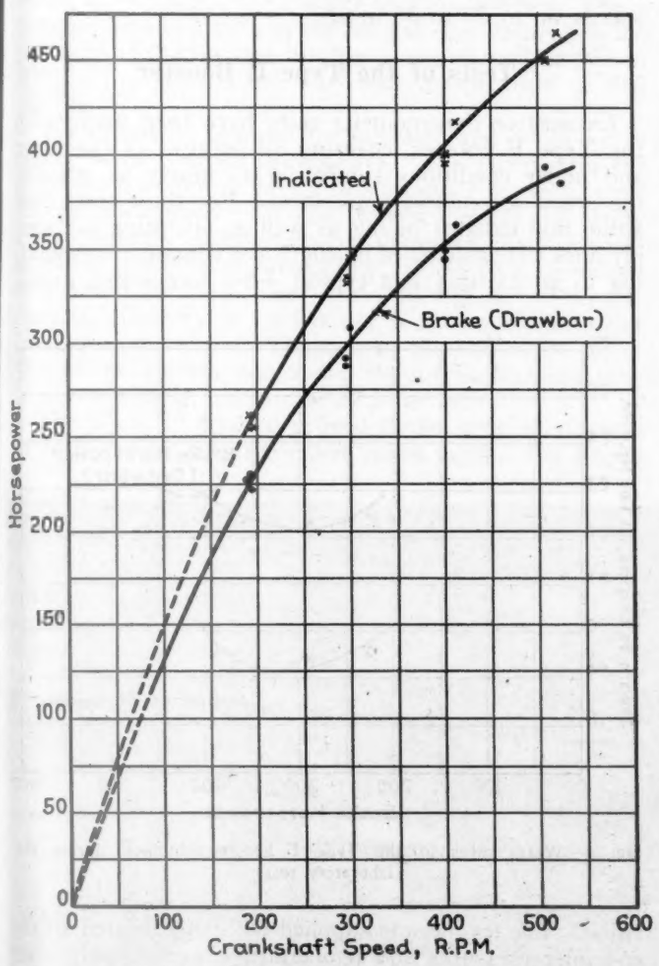


Fig. 1—Indicated and brake horsepower of the Type E booster in relation to crankshaft speed

In recent years there have been definite changes in locomotive design, operation and performance to meet the requirements of improved train performance. In keeping with the trend to higher pressures, which in some cases reach 350 lb. per sq. in., and the necessity for faster operation between terminals, the Franklin Railway Supply Company, New York, has developed the Type E Booster which is especially adapted to the new operating conditions.

The trend toward higher steam pressures in modern locomotives has been followed in the booster design. All parts are suitable for boiler pressures up to 350 lb. per sq. in.

The cylinders are of cast steel and incorporate liberal steam and exhaust passages arranged for smooth steam flow. The inlet and exhaust apertures are arranged for direct application of the ball joints which connect the flexible pipe lines. The steam inlet is 3½ in. in diameter and the exhaust outlet is 4 in. These features give ample steam supply for high speeds and keep the back pressure low. High-grade cast-iron bushings are provided for barrel and steam chest.

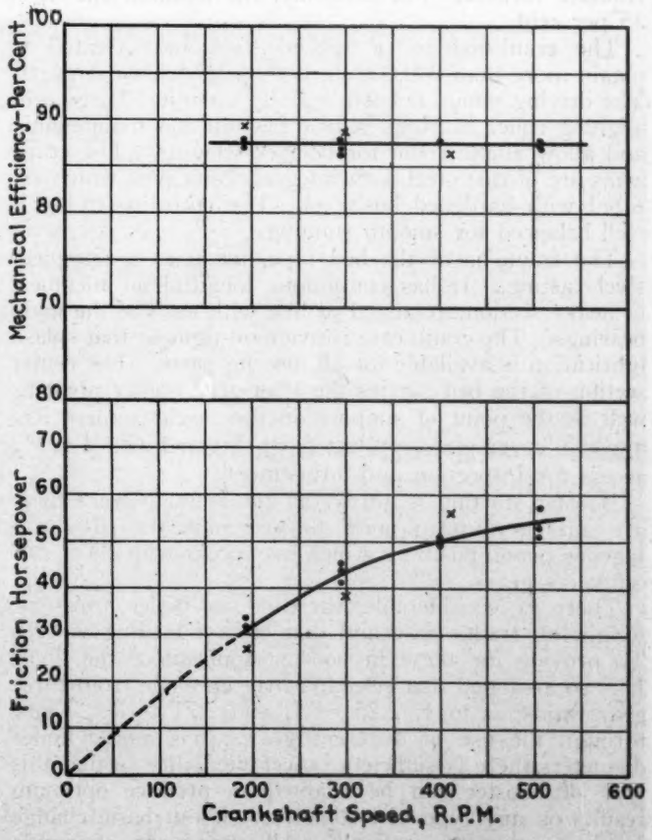


Fig. 2—The mechanical efficiency and friction horsepower of the Type E booster in relation to booster crankshaft speed

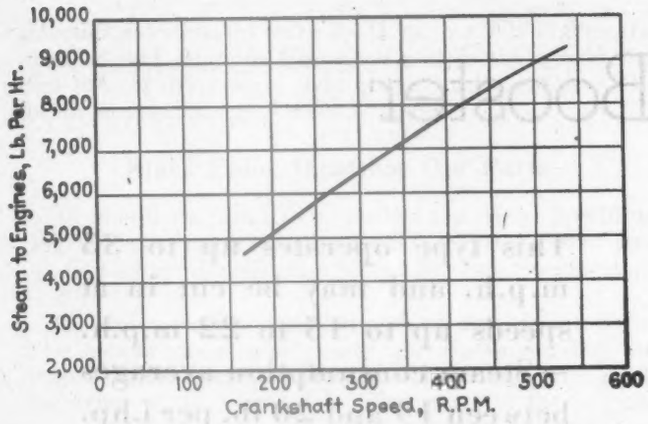


Fig. 3—Hourly steam consumption of the Type E booster engine in relation to crankshaft speed

Pistons are of cast steel equipped with sectional piston packing. Their maximum diameter is 10¾ in. This can be reduced to 10 in. by changing the inside diameter of the bushings. The piston stroke is 12 in. Piston rods are of forged steel, fitted with metallic packing and swab glands. Crossheads are of cast steel with bronze-lined shoes working in replaceable steel guides.

Connecting rods are of I-section, drop-forged from high-tensile steel. Steel-backed babbitt-lined bearings are applied to the crank-pin end and special thin-wall bushings to the crosshead end.

The valves are of the balanced piston type with L-rings. Port areas are ample. Valve stems have metallic packing and swab blands. The valve gear is of the fixed-cut-off type, simply operated by return cranks spline-connected to the crank pins and transferring motion to the valve stems through drop-forged eccentric rods and transfer rockers. For economy, the nominal cut-off is 35 per cent.

The crankshaft is of special steel, heat treated to obtain more than 200,000 lb. per sq. in. tensile strength. The driving pinion is cut integrally upon it. Large self-aligning roller bearings reduce friction and maintenance and allow ample room for balance weights. The crank arms are of cast steel with integral crank pins which are fitted with hardened bushings. The entire assembly is well balanced for smooth running.

The frame is of the bed type, made as a one-piece steel casting. It has continuous longitudinal members of heavy section, arranged in line with each of the main bearings. The crank case is made oil-tight so that splash lubrication is available for all moving parts. The center section of the bed carries the idler-gear rocker pivot as well as the point of support on the truck frame. Removable cover plates protect from dirt and afford ready access for inspection and adjustment.

Booster starting is always at maximum power; there are auxiliary steam ports to overcome the disadvantageous piston positions which may occur with short cut-off valve gears.

There is considerable variation in boiler pressure, weight on trailer axle and diameter of trailing wheels. To provide for these in booster application, the Type E is so arranged that selection may be made from three gear ratios: 2 to 1, 2.25 to 1, and 2.71 to 1. Thus, through the use of different gear ratios and cylinder diameters there is sufficient power flexibility so that this type of booster can be adapted to produce optimum results on any type of locomotive without basic change in the engine proportions. All gears are of ample strength for engagement at speed. An increase of approximately 50 per cent in crank-shaft speed over previous designs allows the Type E to be run at higher locomotive speeds.

For higher cut-in speeds it is necessary to increase the steam supply, at the same time maintaining proper control of idling speed. This is accomplished by the use of a supplementary steam valve in addition to the usual preliminary throttle valve. Both valves take their steam supply from the turret. For idling the preliminary valve alone supplies through its choke sufficient steam, while the supplementary valve remains ineffective. When the booster is cut in, both the preliminary and the supplementary valves are opened. The greater steam supply furnished by the two valves in combination insures sufficient booster speed for engagement when the locomotive is moving at speeds up to the maximum engaging limit (15 to 22 m.p.h., depending upon wheel diameter and booster gear ration). The booster may remain engaged and is capable of doing useful work at speeds up to 30 to 35 m.p.h.

Tests of the Type E Booster

Exhaustive dynamometer tests have been made with the Type E booster, covering all features of operation and under conditions simulating as nearly as possible the actual locomotive application. For these tests, live steam and exhaust piping as well as operating air supply lines were assembled in length and volume corresponding to an existing and typical 4-8-4 locomotive installation. The engine was supplied with superheated steam and inlet pressures and temperatures were closely controlled.

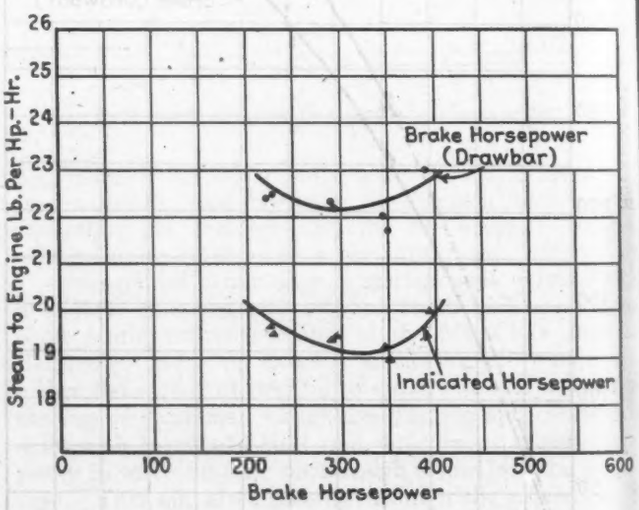


Fig. 4—Water rates of the Type E booster obtained during the laboratory tests

The delivered power was measured by an Alden dynamometer; all speeds were carefully controlled. Simultaneously, indicator cards were recorded. Temperature records were obtained for inlet and exhaust steam at the cylinder passages and in the pipe lines, a centrally located potentiometer being employed.

To determine the steam consumption, the exhaust was passed through a condenser and the condensate was weighed. In order to insure water-rate readings which would be truly representative of road conditions, each test was first run exhausting to the atmosphere. The pressure readings in the exhaust lines were noted. A duplicate run was then made exhausting through the condenser and the exhaust line was throttled down so

that the back pressure at the booster cylinder was the same as when exhausting to atmosphere. Thus, the condenser served only to trap the exhaust steam for weighing and did not affect the engine performance.

The tests were run at crankshaft speeds varying from 50 to 600 r.p.m. The total running time was 110 hours, corresponding to approximately 2,500 miles with a 45-in. trailer wheel. Of these runs, 85 per cent were at speeds between 300 and 600 r.p.m. Several tests were made which required continuous booster operation for 4½ to 5 hours. The long continuous tests showed that this booster can be operated satisfactorily for extended periods of time.

The test results for the indicated and brake horsepower are shown in Fig. 1. It will be seen that the horsepowers continually increase over the speed range. While the brake horsepower tends to flatten out at the higher speed, the indicated horsepower continually rises. These data are representative of the booster operation when the pressure at the booster throttle is maintained at 195 to 200 lb. per sq. in. and the steam temperature at 540 deg. F.

The difference between the indicated and brake horsepower is the friction horsepower. The increase in the indicated horsepower gave a proportionate increase in the friction horsepower. In other words, there is apparently a very definite relation between the mean effective pressures and the friction horsepower. These data are shown in relation to the booster speed in Fig. 2. The mechanical efficiency of the booster is shown in the upper portion of the chart. Throughout the test range of indicated horsepower and speed, the mechanical efficiency is approximately constant at 87.5 per cent.

The Type E booster proved to be very economical in performance over the entire speed range. On Fig. 3 is shown the total steam supplied to the booster per hour compared to the crankshaft speed. The maximum re-

(*Continued on page 408*)

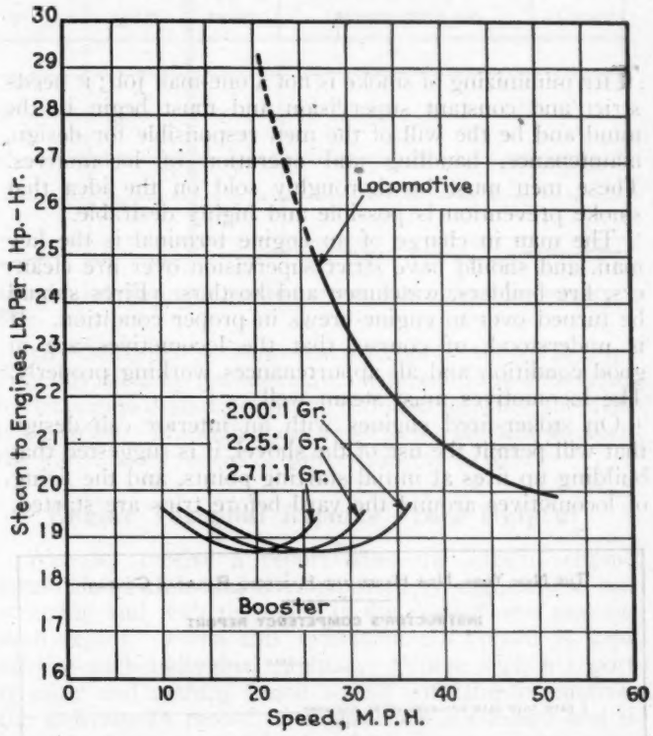


Fig. 5—A comparison of the steam rates of the Type E booster with those of a locomotive—boiler pressure 205 lb. per sq. in.; steam temperature 600 deg. F.

Booster test plant with condenser in foreground, crankshaft end of booster in middle distance, and dynamometer at rear

Smoke Prevention*

By W. C. Shove†

Strict and constant supervision needed to correct smoky terminal conditions which result in fuel loss and criticism of railroads

THE minimizing of smoke is not a one-man job; it needs strict and constant supervision and must begin in the mind and be the will of the men responsible for design, maintenance, handling and operation of locomotives. These men must be thoroughly sold on the idea that smoke prevention is possible and highly desirable.

The man in charge of an engine terminal is the key man, and should have strict supervision over fire cleaners, fire builders, watchmen and hostlers. Fires should be turned over to engine crews in proper condition. It is understood, of course, that the locomotives are in good condition and all appurtenances working properly. The locomotives must steam well.

On stoker-fired engines with an interior cab design that will permit the use of the shovel, it is suggested that building up fires at initial starting points, and the firing of locomotives around the yard before trips are started,

THE NEW YORK, NEW HAVEN AND HARTFORD RAILROAD COMPANY

INSTRUCTOR'S COMPETENCY REPORT

Date.....

I have this date accompanied #1 Engineer.....
or
#2 Fireman .....

Roster.....on Trains.....Eng. No.....

Between.....and .....

.....

#1 ENGINEER

I.....find him qualified to operate these trains over said territory.
Do or do not

Reason for failure to qualify.....

.....

#2 FIREMAN Type Stoker.....

I.....find him qualified to operate this type stoker or type locomo-
Do or do not
tive.

Reason for failure to qualify.....

.....

.....

SIGNED: Road Foreman.....

Engineer.....

Fireman.....

Report to be submitted to Eng. Dispatcher at terminal from which man is assigned.

Fig. 1—Type of report used in qualifying individual crew members for particular classes of service

be done with the shovel. This practice is recommended at starting points only where a green fire is involved because after the fire is once set, which has a bright burning bed, and the brick arch is warmed up, there does not seem to be as much chance of damaging the fire.

No large locomotive equipped with brick arch steams freely when starting on its run until the arch and boiler have warmed up enough so as to assure better combustion. In a number of cases bad fires are started leaving terminals on account of crowding the fire before the arch is heated to a point where perfect combustion will take place. As a possible remedy for this, it is recommended that where boiler and water conditions permit, an effort be made to start on the run with enough water in the boiler to permit the loss or drop in boiler water for a few minutes or a few miles, until the arch has heated up, and relieve the inclination on the part of the fireman to crowd the firebox with coal when it is not being properly burned in an effort to maintain maximum steam pressure.

Boiler Feeding Important

Boiler feeding is an outstanding factor in coal and smoke performance, either good or bad. The most economical method of boiler feeding is to leave the injector or feedwater pump on continuously or nearly so and adjust the feed according to conditions of the run. It is recommended on leaving the initial terminal that the injector be used the first few miles in preference to feedwater heater.

It is the opinion of many that objectionable smoke can be eliminated if the engine crew is smoke conscious and uses proper precautions in handling locomotives. Instructions have been devoted almost exclusively to firemen, but the engineman who in the final analysis uses the steam can, by close cooperation with, and intelligent direction of, the fireman, make it possible to obtain the best results. It is common practice on the New Haven to use hand signals to warn firemen when approaching points where the throttle is to be closed.

A large proportion of the good coal and smoke records can always be traced to the engineman who, by intelligent interest in performing his duties, accomplishes smooth, steady running. On the contrary, if he takes but little interest, the fireman will be compelled to take things as they are and may be blamed for the lack of skill or carelessness of the engineman.

Supervisors should become enthusiastic in their endeavors to educate and devise new and novel means of instilling smoke consciousness into the minds of all those concerned with maintenance and operation of locomotives.

All Supervisors Responsible

When we speak of supervision, it should apply to all railroad supervision as well as locomotive supervisors. Operating officers can be very effective in their efforts

* Abstract of a paper presented at a roundtable discussion on locomotive smoke abatement on June 8 during the annual meeting of the Smoke Prevention Association held in Detroit, Mich.

† Road foreman of engines, New York, New Haven and Hartford, New Haven, Conn.

NGINEER OR FIREMAN

RECORD OF ROAD FOREMAN SUPERVISION
Or Instructing Fireman

DATE	SUPERVISED BY	LOCO.	DATE	SUPERVISED BY	LOCO.	DATE	SUPERVISED BY	LOCO.

his record is used on the New Haven to show how much supervision and instruction individual crew members receive in the proper performance of their duties

to minimize smoke. There is no one as helpful in this endeavor as the division superintendent. He can, by his efforts, let it be known that he is vitally interested. This gives the road foreman of engines, fuel supervisors, and others riding locomotives real backing in their endeavors. It is my thought that education is one of the outstanding factors in the minimizing of undesirable smoke.

When speaking of smoke consciousness and education we, on the New Haven, have endeavored to make engine crews smoke conscious by the following methods:

Taking smoke density readings from the rear of passenger trains each 30 sec. covering a one-hour run. The photostat of a graph taken on such a run is illustrated. Copies of these are posted on the bulletin board at engine terminals without identification and a bulletin accompanying this graph criticizes the violations.

As it noted in the graph in Fig. 3, the number one run is a very good performance, while the number two and three runs are not good. It is surprising how many firemen will inquire if they were the offenders. This information is given only to the guilty party. Where the performance is good as in the number one run, the fireman is shown the record as taken and complimented for his efforts.

Another method is the photographing of one of our own locomotives belching forth heavy volumes of dense smoke. Photostat copies are posted at the various engine terminals and, in my opinion, they are of much more benefit than the poster used of an artist's conception. The repeated showing of the Baltimore & Ohio animated motion pictures, entitled "Three Atoms," was helpful.

Fuel Conservation Cards Distributed

Don't overload tenders.
Don't overfill scoops.
Don't shake grates or use the hook when it may be avoided.
Don't allow pops to open unnecessarily.
Don't permit a dirty deck or apron, allowing coal to rattle off.
Don't knock coal off by careless handling of tools.
Don't throw large lumps into the fire—crack them.
Don't use blower except when necessary.
Don't permit fire to get too heavy and dirty.
Don't bring locomoitve to terminal with a heavy fire.
Don't allow fire to die out in front of firebox causing leaky flues.
Don't bank fires and leave doors open when descending grades or stopping.
Don't fire on green coal or any spot unless white.
Don't permit banks.
Don't fail to report work on engines properly.
Don't fail to drift slow-downs and other places where possible.

By observing the above we don't make smoke.

We have a system whereby a record of road supervision received by an engineer or fireman, whether it be a road foreman of engines, Diesel instructor, or an instructing fireman, a copy of which is shown in Fig. 2. There are many times when enginemen or firemen may have to be called from the extra list to instruct student engineers or student firemen.

An "Instructor's Competency Report," shown in Fig. 1, is furnished by the instructor, with one copy submitted to the engine despatcher at the terminal to which the man is assigned. Through these reports we are able to keep the individual's record of supervision up to date.

Engine Terminal Reports Prove Helpful

We also receive a report from the various engine terminals of all locomotives reported by engineers as not steaming and with the name of the engine crew making such report. From this information a record is kept against each individual fireman. Where such a report is made and nothing found wrong with the locomotive, the individual's record of supervision is checked and if his record shows that he has had only a minimum of supervision, further supervision is given him until the supervisor is satisfied that the man is thoroughly competent. This report of "locomotive reported as not steaming" has also proved beneficial in picking out hard steaming locomotives and the engine terminal notified so that corrective action can be taken by them, as a poor steaming locomotive usually is a smoke offender.

In safety work, we become safety minded. Why can't we become smoke minded and then we will not make any more than is necessary.

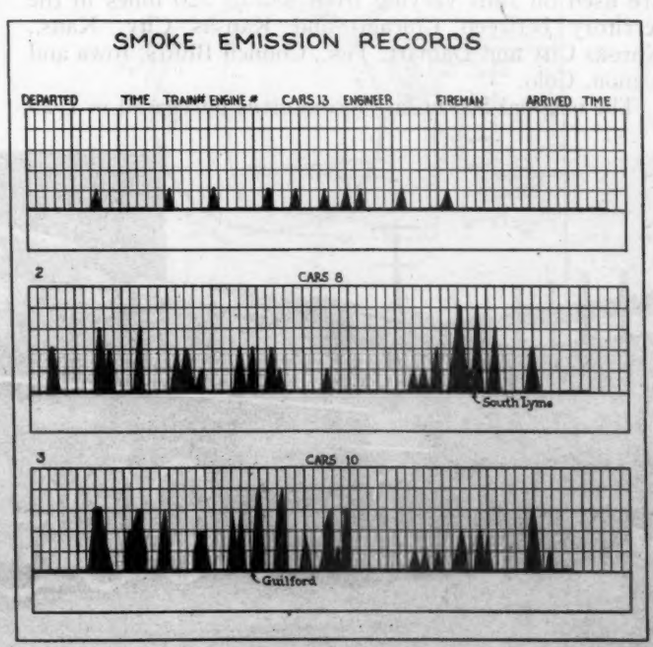


Fig. 3—Smoke density readings taken from the rear of a New Haven passenger train and used in smoke prevention campaign

American Locomotive Company Delivers

Ten Rock Island 4-8-4's

Ten modern units make total of 75 4-8-4 freight locomotives—These have roller bearings, 21,500-gal. tenders and 67,000 lb. tractive force

DURING the first part of this year the Chicago, Rock Island & Pacific added ten 4-8-4 type combination freight and passenger locomotives to its motive power inventory. These new units bear the road numbers 5100 to 5109 and bring the total of the 5000 Class locomotives on the Rock Island to 75, all of which have been built by the American Locomotive Company. The first of this group, a single locomotive, No. 5000, was built in 1929 and followed by 64 more in 1929 and 1930. A comparison of the characteristics of the present order with previous locomotives of the same wheel arrangement is shown in an accompanying tabulation. All of these 5000 Class locomotives are used on runs varying from 495 to 520 miles in the territory between Chicago and Kansas City, Kans., Kansas City and Dalhart, Tex., Council Bluffs, Iowa and Limon, Colo.

Comparative Characteristics of Rock Island 4-8-4 Type Locomotives

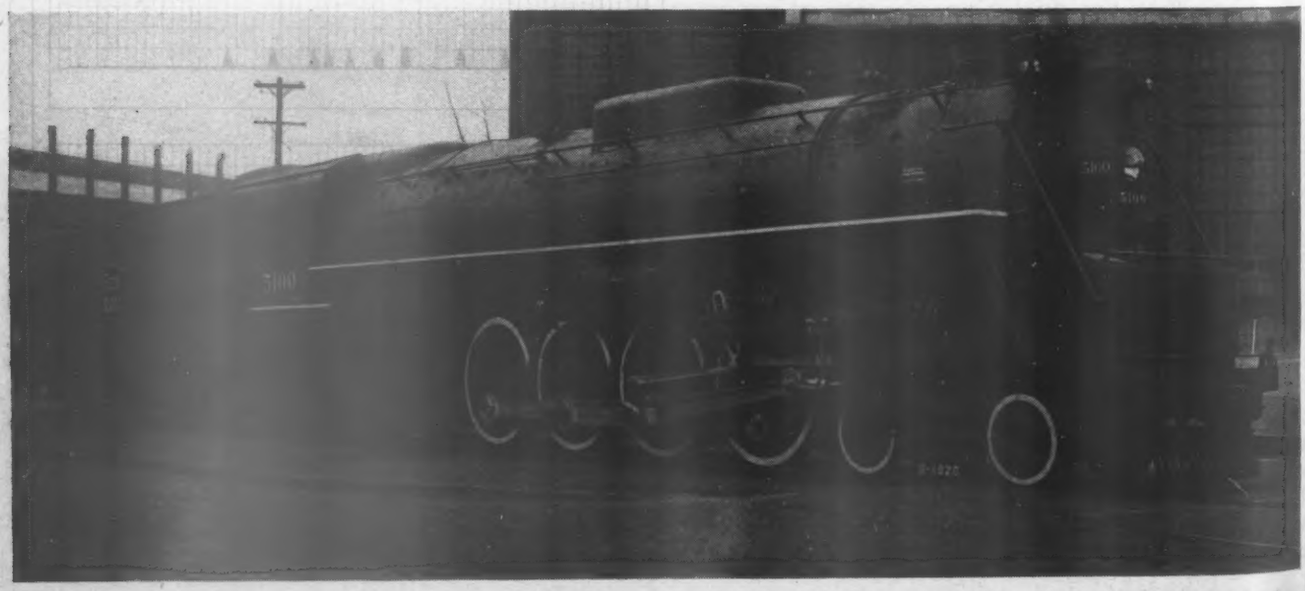
Road Nos.	5000-5024	5025-5064	5100-5109
Builder's order No.	S-1640 S-1655	S-1686	S-1920
Total weight of engine, lb.	434,000	436,000	467,000
Tender weight of tender (⅔ loaded), lb.	292,200	304,300	301,800
Total engine and tender wheelbase, ft.-in.	88—0	88—0	95—11
Boiler pressure, lb.	250	250	270
Driving wheel diameter, in.	69	69	74
Tractive power, engine, lb.	67,000	66,000	67,000
Tractive po lb.	13,100	13,100	.....
Cylinder bore a... in.	26 x 32	26 x 32	26 x 32
Firebox length, in.	132⅛	132⅛	144 1/16
Firebox widt... i...	96¼	96¼	96¼
Grate area, sq. ft.	88.3	88.3	96.3
Evaporative heating surface, sq. ft.	5,443	5,443	4,573
Superheating surface, sq. ft.	2,243	2,243	1,438
Tender water capacity, gals.	15,000	15,000	21,500
Tender fuel capacity	20 tons	20 tons	5,500 gal.

The original 5000 Class locomotives purchased in 1929 and 1930 have since been equipped with roller bearings, 74-in. driving wheels and 20,000-gal. tenders which improvements have contributed to the ability of these locomotives to average as much as 8,700 miles a month.

The boilers of these new locomotives are conical in type and are designed for a working pressure of 270 lb. The outside diameter of the first ring is 86⅝ in. and the first ring is 98 in. outside diameter. These locomotives are oil fired and have fireboxes 144 1/16 in. long by 96¼ in. wide giving an equivalent grate area of 96.3. The fireboxes are designed with three Nicholson syphons in the firebox which support the arch and one in the combustion chamber. The length of the combustion chamber is 84 in.

The oil-burner arrangement is designed with the controls on the left side of the cab and is installed with the burner on the center line of the boiler at the front of the firebox. The oil heater is located in the draft pan at the left side. The firebox is designed to provide for the future application of a Standard BK stoker.

Alco flexible staybolts are used in the breaking zones of the firebox side, in the combustion chamber, throat sheet and backhead. Welding is used extensively in the construction of the boilers. The junctions of the outside firebox and roof sheets are seal welded. The syphons are welded to the crown, throat and combustion chamber sheets and welding is used in numerous places in the construction and sealing of the firebox.



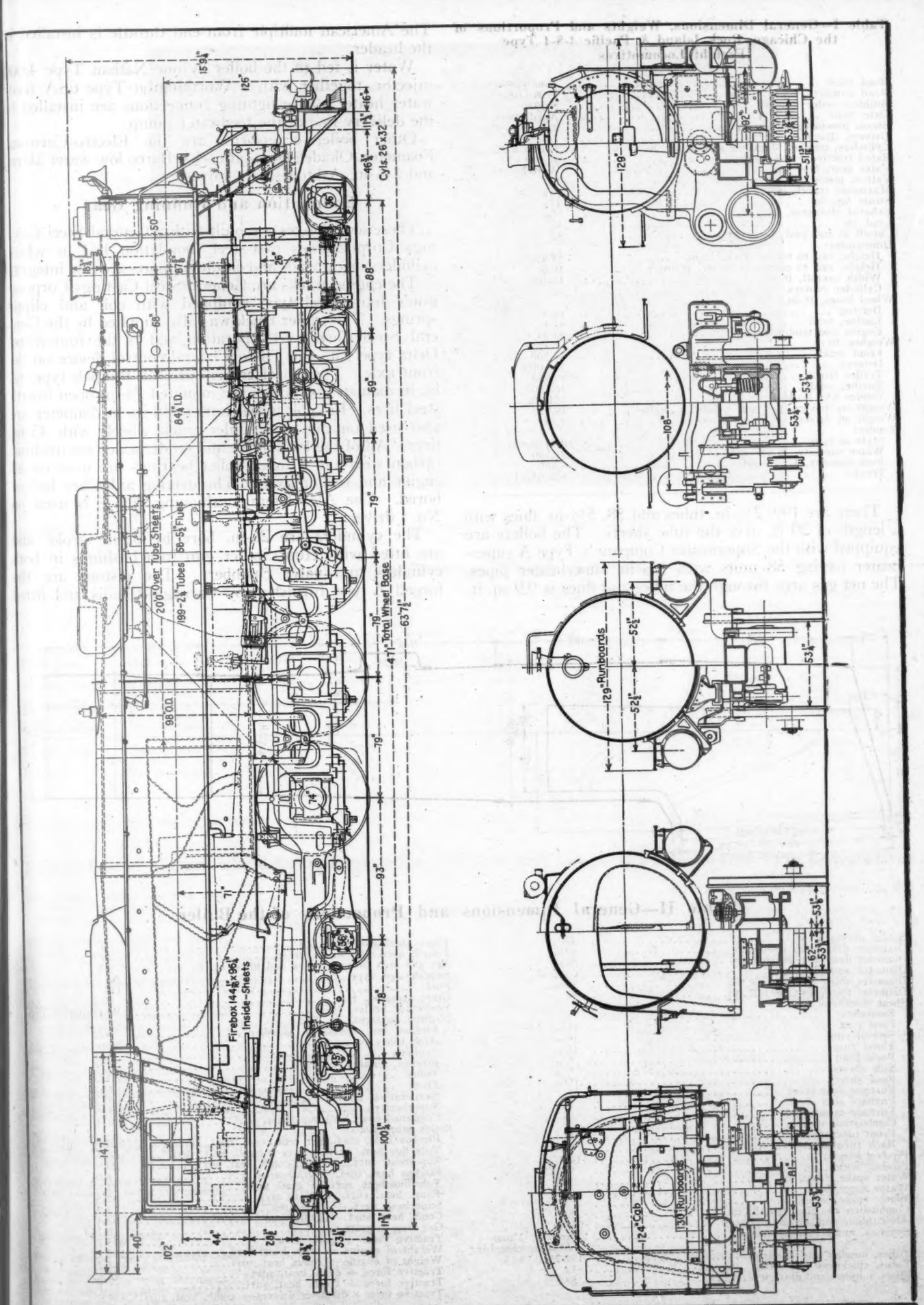

Cyls. 26"x32"
Firebox 144⅛"x96⅛"
Inside-Sheets
200-Over Tube Sheets
199-2¼" Tubes
56-5½" Flues
84" I.D.
98" O.D.
471"-Total Wheel Base
129"-Runboards
124"-Cab
130"-Runboards

Table I—General Dimensions, Weights and Proportions of the Chicago, Rock Island & Pacific 4-8-4 Type Freight Locomotives

Road class	R-67
Road number	5100-5109
Builders order number	S 1920
Date built	April, 1944
Steam pressure, lb. per sq. in.	270
Drivers, diameter, in.	74
Cylinders, number, diameter and stroke, in.	(2) 26 x 32
Rated tractive force, engine, lb.	67,000
Valve gear, type	Walschaerts
Valves, piston, diameter, in.	12
Maximum travel, in.	7⅝
Steam lap, in.	1½
Exhaust clearance, in.	5/16
Lead, in.	¼
Cut-off in full gear, per cent	82
Dimensions:	
Height, rail to top of stack, ft.-in.	15-9¼
Height, rail to center of boiler, ft.-in.	10-6
Width overall, ft.-in.	12-10
Cylinder centers, in.	92
Wheel bases, ft.-in.:	
Driving	19-9
Engine, total	47-1
Engine and tender, total	95-11
Weights, lb.:	
Front truck	87,500
Drivers	280,000
Trailer truck	99,500
Engine, total	467,000
Tender (⅔ loaded)	301,800
Weight on drivers, per cent weight of engine	59.9
Weight on drivers ÷ tractive force	4.18
Tender:	
Style or type	Rectangular
Water capacity, U. S. gal.	21,500
Fuel capacity, U. S. gal.	5,500
Trucks	Six-wheel

There are 199, 2¼-in. tubes and 58, 5½-in. flues with a length of 20 ft. over the tube sheets. The boilers are equipped with the Superheater Company's Type A superheater having 58 units with 1½-in. superheater pipes. The net gas area through the tubes and flues is 9.9 sq. ft. The American multiple front-end throttle is installed in the header.

Water is fed to the boiler by one Nathan Type 4,000 injector, together with a Worthington Type 6SA feedwater heater. Fire fighting connections are installed in the delivery line of the feedwater pump.

Other boiler accessories are the Electro-Chemical Foameter, Okadee blow-off cocks, Barco low water alarm and 3½-in. Ashton safety valves.

Foundation and Running Gear

These locomotives are built with a General Steel Castings Corporation's cast-steel foundation bed in which cylinders, back heads and cradle supports are cast integral.

The engine trucks are General Steel Castings Corporation's four-wheel type equipped with coil and eliptic springs. The trailer truck was also supplied by the General Steel Castings Corporation and is the four-wheel Delta type with the Timken lateral control device on the front axle. The wheel centers are the Boxpok type, 66 in. in diameter on which are mounted 74-in. open hearth steel tires. Boxpok wheel centers 38 in. in diameter are also used on the back trailer truck wheels with 45-in. tires. All of the locomotive and tender axles are medium carbon steel and Timken roller bearings are used on all engine and tender axles. The driving axles are hollow bored. The Alco lateral cushioning device is used on No. 1 driver.

The cylinders are 26-in. bore by 32-in stroke and are fitted with Hunt-Spiller gun iron bushings in both cylinders and valve chambers. The pistons are the forged Z type furnished by Carnegie-Illinois and fitted

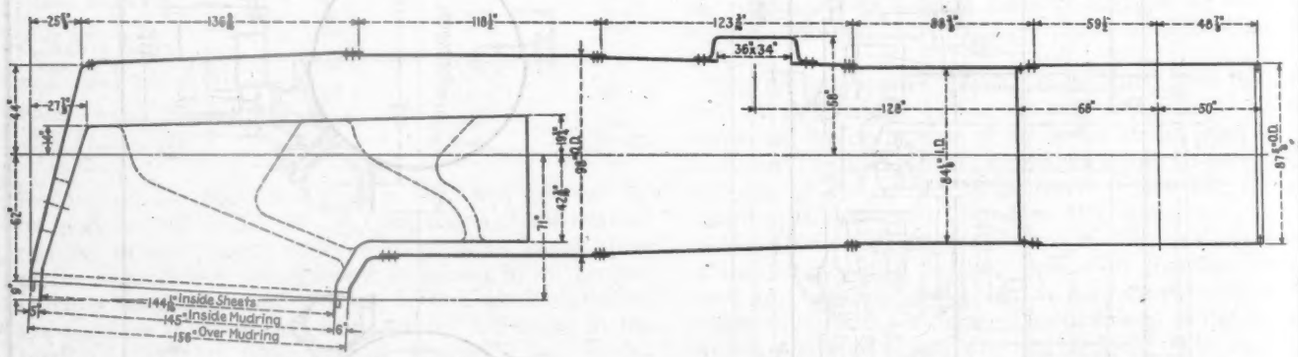


Table II—General Dimensions and Proportions of the Boiler

Steam pressure, lb.	270
Diameter first ring, inside, in.	84¼
Diameter first ring, outside, in.	86⅜
Diameter second ring	Conical
Diameter third ring, inside, in.	96⅜
Diameter third ring, outside, in.	98
Sheet thickness, in.:	
Smokebox	¾
First ring	13/16
Second ring	15/32
Third ring	13/16
Back head	9/16
Side sheets	9/16
Roof sheet	13/16
Furnace door sheet	⅜
Furnace side sheets	⅜
Furnace crownsheet	⅜
Combustion chamber	½
Front tube sheet	⅝
Back tube sheet	9/16
Firebox length, in.	144 1/16
Firebox width, in.	96¼
Water space, front, in.	6
Water space, back, in.	5
Water space, sides, in.	5
Combustion chamber length, in.	84
Arch tubes, number and diameter	None
Syphons, number and location	3-firebox; 1-combustion chamber
Tubes, number and diameter	199-2¼
Tubes, thickness (B.W.G.)	12
Flues, number and diameter	58-5½
Flues, thickness (B.W.G.)	8
Length over tube sheets, ft.-in.	20-0
Net gas area through tubes and flues, sq. ft.	9.9
Superheater, type	A
Fuel	Oil
Grate area, sq. ft.	96.3
Feedwater heater, type	Worthington-6SA
Heating surfaces, sq. ft.:	
Firebox and combustion chamber	423
Arch tubes	None
Syphons	155
Firebox, total	578
Tubes	2,333
Flues	1,662
Evaporative, total	4,573
Superheater	1,438
Combined evap. and superheat.	6,011
Boiler proportions:	
Firebox heat. surf., per cent comb. heat. surf.	962
Tube-flue heat. surf., per cent comb. heat. surf.	66.5
Superheat. surf., per cent comb. heat. surf.	23.9
Firebox heat. surf. ÷ grate area	6.0
Tube-flue heat. surf. ÷ grate area	41.5
Evap. heat. surf. ÷ grate area	47.5
Superheat. surf. ÷ grate area	14.9
Comb. heat. surf. ÷ grate area	62.4
Gas area ÷ grate area	0.114
Tractive force ÷ grate area	695.7
Weight of engine ÷ evap. heat. surf.	102.1
Weight of engine ÷ comb. heat. surf.	77.7
Tractive force ÷ evap. heat. surf.	14.65
Tractive force ÷ comb. heat. surf.	11.1
Tractive force × diameter drivers ÷ comb. heat. surf.	824.8

Table II—Axles, Bearings, Wheels and Tires

	Axles				Wheels or Tires			Wheel Centers		
Location	Material	Manufacturer	Bearings	Journal size, in.	Type and material	Manufacturer	Diam., in.	Type	Manufacturer	Diam., in.
Front truck	Medium carbon	Builder	Timken	8¼	Multiple-wear rolled steel	Bethlehem Carnegie-Illinois	36	.....	.....	..
Drivers, main	Medium carbon hollow bored	Builder	Timken	13$^{31}/_{16}$	Class B	Railway Steel Spring Div. Alco	74	Boxpok	Gen'l Steel Castings	66
Drivers, other	Medium carbon hollow bored	Builder	Timken	12⅝	Class B	Railway Steel Spring Div. Alco	74	Boxpok	Gen'l Steel Castings	66
Trailer, front	Medium carbon	Builder	Timken	6¼	Multiple-wear rolled steel	Bethlehem Carnegie-Illinois	36	.....	.....	..
Trailer, rear	Medium carbon	Builder	Timken	7½	Class B	Railway Steel Spring Div. Alco	45	Boxpok	Gen'l Steel Castings	38
Tender	Medium carbon	Builder	Timken	6¾	Multiple-wear rolled steel	Bethlehem Carnegie-Illinois	36	.....	.....	..

Partial List of Materials and Equipment on the Chicago, Rock Island and Pacific 4-8-4 Type Locomotives

Bed; wheel centers, driving and trailing; engine and trailer truck; bumper ..... General Steel Castings Corp., Eddystone, Pa.

Wheels, engine, trailer and tender truck ..... Bethlehem Steel Co., Bethlehem, Pa. Carnegie-Illinois Steel Corp., Pittsburgh, Pa.

Tires, driving and trailing; springs.. Railway Steel Spring Div., American Locomotive Co., New York.

Springs pads ..... Fabreeka Products Co., Boston, Mass.

Engine and tender bearings; trailer truck lateral motion device ..... The Timken Roller Bearing Co., Canton, Ohio.

Radial buffer ..... Franklin Railway Supply Co., Inc., New York.

Pilot coupler ..... National Malleable and Steel Castings Co., Cleveland, Ohio.

Foundation brake; operating brake; train signal ..... Westinghouse Air Brake Co., Wilmerding, Pa.

Brake shoes ..... American Brake Shoe Company, New York.

Air brake hose ..... B. F. Goodrich Co., Akron, Ohio.

Bushings; rods; piston rings, packing rings; bull rings; bell..... Hunt-Spiller Manufacturing Corporation, Boston, Mass.

Air pump packing; lagging..... Johns-Manville Sales Corp., New York.

Piston packing; valve rod packing.. U. S. Metallic Packing Co., Philadelphia, Pa.

Pistons ..... Carnegie-Illinois Steel Corp., Pittsburgh, Pa.

Operating valve; sander ..... Viloco Railway Equipment Co., Chicago.

Power reverse gear; staybolts; lateral cushioning device ..... American Locomotive Co., New York.

Valve gear needle roller bearings.... Pilloid Co., New York.

Alemite fittings; cylinder cocks; cab windows and windshields ..... The Prime Manufacturing Co., Milwaukee, Wis.

Tubes and flues ..... The Babcock & Wilcox Tube Co., Beaver Falls, Pa.

Boiler steel ..... Bethlehem Steel Co., Bethlehem, Pa.

Superheater ..... The Superheater Company, New York

Throttle ..... American Throttle Co., New York.

Feedwater heater ..... Worthington Pump and Machinery Corp., Harrison, N. J.

Injector; injector checks; mechanical lubrication ..... Nathan Manufacturing Co., New York.

Washout plugs ..... T-Z Railway Equipment Co., Chicago.

Oil-firing shut-off valves ..... Walworth Company, New York.

Safety valves; air gauges; steam-heat gauges ..... Ashton Valve Co., Boston, Mass.

Gage holders ..... Swanson Tool & Machine Corp., Erie, Pa.

Blow-off cocks ..... The Okadee Company, Chicago.

Low-water alarm; connections between engine and tender ..... Barco Manufacturing Co., Chicago.

Foam meter ..... Electro Chemical Engineering Corp., Chicago.

Headlight and generator ..... The Pyle-National Company, Chicago.

Steam-heat connectors at rear of tender ..... Vapor Car Heating Co., Inc., Chicago.

Tender:

Tank steel ..... Bethlehem Steel Co., Bethlehem, Pa.

Frame ..... General Steel Castings Corp., Eddystone, Pa.

Trucks ..... Buckeye Steel Castings Co., Columbus, Ohio.

Coupler; coupler yoke ..... National Malleable and Steel Castings Co., Cleveland, Ohio.

Brakes ..... American Steel Foundries, Chicago.

Brake shoes ..... American Brake Shoe Company, New York.

Spring snubbers ..... Cardwell Westinghouse Co., Chicago.

Side bearings ..... A. Stucki Co., Pittsburgh, Pa.

Draft gear ..... W. H. Miner, Inc., Chicago.

forged Z type furnished by Carnegie-Illinois and fitted with Hunt-Spiller gun iron rings. The piston valves are 12 in. in diameter with a maximum travel of 7⅝ in. The valve gear is the Walschaerts type with Multiroll needle roller bearings, controlled by an Alco Type G power reverse gear. The cut-off in full gear is 80 to 82 per cent. The crossheads are the multiple bearing type tin lined and fitted with SAE 1065 carbon steel keys. The crankpins are medium carbon steel and all except the front pins are medium hollow bored. The side and main rods are medium carbon steel and where floating bushings are used Hunt-Spiller fixed bushings are used with bronze floating bushings.

In counterbalancing these locomotives, the wheels at positions 1, 3 and 4 are counterbalanced for a static overbalance of 147 lb., 145 lb. and 144 lb. respectively, without crossbalance considered. The main wheel, No. 2, is crossbalanced with an overbalance of 93 lb. on the right side and 146 lb. on the left side. The main wheels have a single counterbalance segment at an angle of 7 deg. 35 min. in advance of the center line of the crank. The total weight of reciprocating parts is 1,997 lb. per side of which 675 lb. or 34 per cent has been balanced. The dynamic augment at diameter speed is 7,550 lb. at No. 1 wheel, 7,450 lb. at No. 3 and 7,400 lb. at No. 4. At the main wheel it is 4,780 lb. on the right side and 7,500 lb. on the left.

The spring rigging on these locomotives is the conventional type with equalization continuous from the front of the No. 1 driving wheel to the rear of the back trailer wheel. Coil springs are used at the ends of the system and ¼-in. Fabreeka pads are used on all truck and driving semi-elliptic springs.

Mechanical lubrication of cylinders, valves, guides, feedwater pump and throttle is furnished by a Nathan DV-7, 36-pin, 14-feed mechanical lubricator on the right side and an identical lubricator on the left side supplying the valve stem guides and crosshead, frame pedestal wedges, engine truck center pin guide and the radial buffer. Alemite grease lubrication is used on rods and motion work.

The foundation brake equipment is the Schedule N 280.114 supplied by the American Brake Division of the Westinghouse Air Brake Company. The operating brake is Westinghouse No. 8 ET. Air is supplied by two 8½-in. cross-compound compressors and the main reservoir storage consists of two 22½-in. reservoirs, one 72-in. in length and the other 120 in. long. The total reservoir capacity, including the sump reservoir, is 72, 223 cu. in.

The cab is the welded steel type equipped with Prime front and clear vision windows and windshields. There are two seats on the left side of the cab and a single seat for the engineman on the right side.

The Tender

The tanks of these tenders, rectangular in design have a water capacity of 21,500 gals. and a fuel capacity of 5,500 gal. The tanks are mounted on a General Steel Castings Corporation underframe. The tender trucks are the Buckeye six-wheel center-bearing type with ASF clasp brakes. The tender wheels are 36 in. in diameter, mounted on medium carbon-steel axles operating in Timken roller bearings. The tender draft gear is Miner A 22 XB with National couplers and yokes. The Franklin radial buffer is used between the engine and tender. Vapor steam heat connectors are installed at the rear of the tender and Barco flexible connectors are used for air, oil and steam lines between the engine and tender.

Dynamometer Tests of Type E Booster

(*Continued from page 401*)

quirement for the booster was 9,010 lb. per hour and this occurred at 508 r.p.m, when the maximum horsepower was being produced.

The steam rates per indicated and per brake horsepower are compared to the developed brake horsepower in Fig. 4. These data show that the minimum water rates are obtained when the booster is producing about 300 brake horsepower and the average minimum water rate is 19.1 lb. per i.hp.hr. and 22.2 lb. per h.hp.-hr. The table gives the performance for maximum indicated horsepower and maximum economy.

Performance at Maximum Power Output and Maximum Economy

	Maximum i.hp.	Maximum economy
Speed, r.p.m.	508	400
Inlet steam temperature, deg. F.	545	551
Exhaust steam temperature, deg. F.	268	268
Inlet pressure, lb. per sq. in.	181	184
Exhaust pressure, lb. per sq. in.	11.2	10.2
Steam to booster, lb. per hr.	9,010	7,580
Indicated horsepower	449.7	399.3
Steam rate, lb. per i.hp.-hr.	20.0	19.0
Brake horsepower	392	349.5
Steam rate, lb. per b.hp.-hr.	23.0	21.7
Mechanical efficiency	87.2	87.5

The water rates for the booster, plotted against locomotive speed for the three standard gear ratios applied to 45-in. trailing wheels, are shown in Fig. 5. These rates are shown for a boiler pressure of 205 lb. per sq. in. and temperature of 600 deg. F. For comparison the water-rate curve of a conventional locomotive of similar characteristics and with 70-in. drivers is shown. This

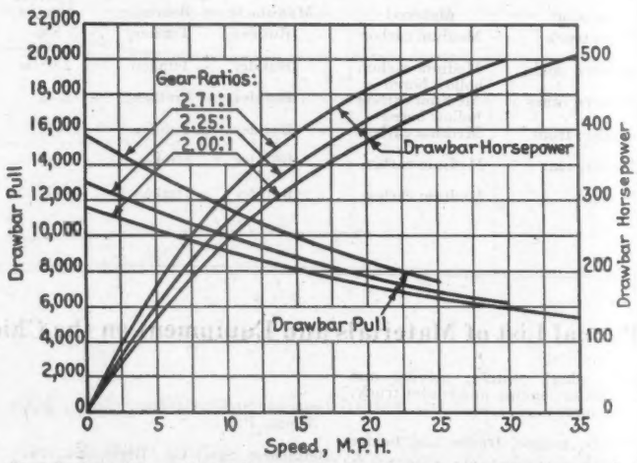


Fig. 6—Drawbar pull and horsepower in relation to locomotive speed at three gear ratios with a 44-in. trailer wheel—Boiler pressure 270 lb. per sq. in.

is existing relation for one locomotive. An alteration in the temperature and pressure conditions will affect locomotive and booster performance alike and the relative improvement with the relationship will be approximately the same. In all instances, within the booster speed range the booster water rates are very much less than those of the locomotive.

The power which is produced by the Type E booster applied to a locomotive with 270 lb. boiler pressure and having 44-in. trailer wheels is shown in Fig. 6. The drawbar pull and drawbar horsepower are shown for the three standard gear ratios. The 2.71 to 1 gear ratio gives the greatest power, but, of course, the speed range is less than can be obtained with the other gear ratios.

The test showed that this engine is capable of producing a horsepower for each 15 lb. of booster engine weight.

EDITORIALS

A Locomotive Is As Good As Its Boiler

Before the war put the pressure on the rail transportation facilities of this country and produced a volume of business that necessitated a degree of utilization not realized in peacetime there were many studies made that purported to show how much better a modern locomotive was than an obsolete one and how much more profitable it would be for the railroads to retire a substantial portion of their old power and buy new power. Regardless of the degree of intelligence used in the making of such studies there always remained the fact that it took a certain amount of traffic to move in order to demonstrate the value of high speed and high hauling capacity. The peacetime traffic on many roads did not always lend itself to a demand for maximum effort on the part of motive power. Therefore outstanding motive power performances were the exception rather than the rule. The result was a rather low volume of new locomotive orders and a rapidly increasing average age of the motive power inventory.

The war has changed all this. Instead of having to despatch trains on schedule regardless of tonnage it is now not unusual to have a yard full of tonnage trains waiting for power to handle them. The only question is power and the fact that there have been no seriously prolonged motive power shortages has been due to maximum utilization, some degree of centralized control of pooling of power and getting them through the shops and terminals in a hurry.

Under these wartime conditions the new motive power—steam, Diesel and electric—has walked right out in front of the parade and demonstrated beyond any question of doubt that the older power can not even compete with it and quite often only jams up traffic if used on a high-density stretch of main line. Steam being the oldest form of motive power and representing the greatest proportion of the inventory, it is natural that its performance has been watched most closely.

Among the outstanding characteristics of a modern locomotive which were absent in the older power are high-capacity boilers, integral cast beds, better counterbalancing and roller-bearing journals. Of all of these, with due credit to the value of the others, the high capacity boiler is probably the most important. The freight locomotive of 20 years ago may have as much tractive force at 10 m. p. h. as the modern 4-8-4 but as the speed increases it becomes obvious that the modern unit has something that was never built into locomotives 20 years ago—large boiler capacity. By actual comparison, on one road, a group of modern locomotives of almost identical tractive force as another group 20 years old have boilers some 1,500 hp. greater in capacity. On tonnage grades and at higher speed in level territory this difference in boiler capacity really makes itself useful.

One of the most valuable lessons learned from our present experiences is the futility, from an economic standpoint, of spending large sums in modernizing old power. You can hang all kinds of accessories on a 20-year-old locomotive and it is still an obsolete locomotive unless it has boiler capacity comparable with the improved mechanical facilities. For, after all, without sufficient steam a steam locomotive can not haul maximum tonnage over the road satisfactorily. Every five-pound drop in boiler pressure is reflected in reduced hauling capacity at the drawbar.

Leadership

The thought of progressive railway management about the responsibility of supervisors to instruct, guide, discipline and develop employees who work for them is well expressed in recent comments on leadership by an operating vice-president.

In the opinion of this executive officer, railway supervisors, including those of the mechanical department, must recognize the importance of being fair and square in all dealings with their men, who have no more fundamental urge than the desire for security, progress and promotion. Constructive leadership sees the importance of encouraging men to ask questions and not be satisfied until they understand the "Why" and the "How" of every operation going on around them. It also sets up as the main objective, "Not how much, but how well and safely done."

Regarding rules, much can be said. Supervisors must always emphasize the importance of rules; the necessity in individual and group effort of all employees knowing the rules and understanding them alike; also the fact that ignorance or infraction of rules invites penalties including accidents which involve personal injury, property damage or both. Effective leadership always emphasizes the fact that rules are made to be observed and not broken; that even a minor rule may be of great importance under certain conditions; and that, therefore, it is as bad to ignore the violation of a minor rule, as it is to break a more vital one.

Constructive leadership appreciates that it is disastrous to efficiency and safety to permit any rule violation to pass unnoticed and yet that harsh punishment for a rule violation may in some cases have an effect

opposite to that desired. In other cases, firmness and even sternness are both desirable and necessary. Progressive supervisors appreciate that, in planning or executing any project or campaign, no detail is unimportant; that results will be in direct ratio to the capacity and interest of the men who do the job and how well they work together; also that, now and always, men are more important than tools and equipment.

Welding—The Railroad Orphan

An increase in the use of welding has taken place in railroad shops during the war years due largely to material shortages and the necessarily imposed shop manufacture of many items required in the repair of cars and locomotives. Not only have repair parts been fabricated by welding but there also has been a very considerable increase in the repair and reclamation of essential structural and operating parts which would probably not have occurred without the compulsion of accelerated shop schedules and lack of materials. Notable among these are the provisions for the welding of cast steel couplers and freight car truck sides which have been approved by the Mechanical Division of the A. A. R. and incorporated in the Rules of Interchange. It is questionable how many years might have passed, if there had been no war, before full recognition would have been afforded controlled welding procedures in the performance of some of the operations now permitted by Rule 23.

Railroads, which gave a great initial impetus to welding in industry, have, as a group, now lagged behind in recognizing that a great mass of accumulated data and experience will support the further extension of welding in both building and repair operations. Individually a number of roads have gone far in exploring the field and extending the use of welding; others are not even taking advantage of the pioneering work done for them by these roads. It is not possible to judge how much of this is due to lack of knowledge and how much to unfounded prejudice, which in itself often results from lack of knowledge. Whatever the reason, there is considerable evidence to support the idea that railroad mechanical men are not as interested as they could be in the study of welding as an engineering problem. Fewer than twenty-five members of the American Welding Society come from the mechanical departments of the United States and Canadian railroads although this is the body which is the recognized authority in welding research and the only engineering group interested in the study of welding procedures and applications.

Operating through their committees in the Mechanical Division or in the various minor associations, railroad mechanical men could benefit through a closer relationship with the Welding Society either as members or as co-workers in the study of specific problems related to design, application or inspection. For many years the American Railway Engineering Association has undertaken joint studies with representatives of the Welding Society in matters where welding was involved; for a number of years they have contributed funds to the extent of $5,000 annually toward a research project investigating the fatigue strength of welds. In many instances the AREA in its specifications makes direct citation of governing standards established by the American Welding Society. That this relationship has been considered valuable is evidenced in numerous committee reports of the AREA.

The mechanical departments, undoubtedly, can function effectively and deal adequately with welding without outside assistance and advice if they choose to do so. Much that is valuable has been accomplished in this way. However, a broader base for improvement seems to lie in utilizing, to the extent to which it is applicable, the general knowledge of welding which comes from experience in many industries. Regardless of the fact that there might be a tendency to regard railroad welding problems as peculiar, the fact remains that the great bulk of railroad welding is on plain carbon steels and the experiences of others in welding these steels under varied conditions and in innumerable applications cannot but be valuable in studying railroad welding needs. Where other metals and the alloy steels are concerned such experiences are even more valuable.

In the years to come we can expect to see many more standards established for welding practices in the locomotive and car field; it will be highly desirable to have them all set in conformity with the best understanding of sound engineering principles in welding design and procedures then to be had. The railroads should not lack for good welding engineers whose activities must include advice to designers and instruction to shop forces on purely welding problems. Inter-railroad cooperation through the Mechanical Division would be valuable in these matters.

Utilization Of Car Equipment

Some exceptionally pertinent discussion of railway car utilization in the present emergency and the contribution of car department forces to the remarkable results accomplished was developed at a recent meeting of the Car Department Association of St. Louis. The increase in average load from 36.8 tons per car in 1939 to 41.5 tons per car in 1943 was mentioned, also the increase in average haul per ton from 351 miles in 1939 to 460 miles in 1943, or 31.1 per cent. In this same period the net tons per serviceable car per day increased 80.3 per cent.

Considering the loss of car-repair men to defense plants and military service and the consequent serious difficulty of maintaining adequate forces of experienced car men, the success attending railway efforts to repair cars quickly, keep bad orders at a minimum and meet

practically all demands for freight equipment, rates as an outstanding achievement. The increased effectiveness of car-repair operations, as reflected in the efforts both of supervision and individual car men, is shown to some extent by the fact that the number of revenue freight ton-miles per carman employed was 52.5 per cent greater in 1943 than in 1939.

Similarly, the utilization of car equipment has been intensified, the average miles per passenger increasing from 50.2 miles in 1939 to 106 miles in 1943, or 110.8 per cent. In the same period the number of passengers per car increased 155.6 per cent and the number of revenue passenger miles per carman 90.6 per cent. As in the case of freight equipment, the relatively low percentage of bad order cars on practically all roads does not necessarily reflect a high standard of maintenance, but shows the intensified efforts which railroads are making to do only enough repair work to keep a high percentage of cars in service.

Train Telephone Receives An Endorsement

The Pennsylvania's announced intention to proceed with a large-scale installation of train telephone communication seems to assure the permanence of this long-tried and much-discussed facility. Pioneering experiments were made in the early twenties and in 1925 a carrier or wired-wireless system was tried on several railroads in regular train operation. At intervals since that time various types of inductive, carrier and radio systems have been experimented with by a number of railroads and a few permanent installations of the type selected by the Pennsylvania have been made. More recently the subject has been given considerable stimulus by developments coming out of the war, by intensive study given to the system adopted by the Pennsylvania, and by criticism of the railroads for not having generally adopted train communication as a safety device.

The railroads have replied to the criticism by pointing out what has been done in an effort to bring communication systems to the necessary degree of perfection, and by considerably increasing their studies of the subject for the purpose of determining its usefulness. It now appears that end-to-end and train-to-wayside communication offers some desirable safety factors and it is becoming increasingly evident that it will be of great benefit in providing the shipping and traveling public with better railroad service.

The Pennsylvania's new installation will include two main-line, four-track divisions, covering 245 miles of line between Harrisburg, Pa., and Pittsburgh, and will require the equipping of 300 passenger and freight locomotives, 90 freight-train cabin cars and six wayside towers. It will provide communication between trains and wayside towers, between opposite ends of a moving train and between moving trains themselves.

The subject of train communications will be discussed at a hearing to be held by the Federal Communications Commission, in Washington, D. C., on September 13, to investigate the value of train communication and the desirability of allocating radio channels to the railroads for this purpose. Recent work done by at least ten railroads should supply much of the information sought, and the Pennsylvania's plans afford unmistakable evidence that at least one railroad is convinced that train communication can be an important factor in improving train operation.

A Locomotive Maintenance Log

A practice which is becoming established in connection with the maintenance of Diesel-electric locomotives is the recording of all work done on the locomotive in a log book which stays on the locomotive. Thus, wherever the locomotive may turn up for servicing or repairs, the terminal forces have a complete record of all work done on the locomotive at the end of previous trips, irrespective of the terminal at which the work may have been done.

Would not such a record, to be kept with each steam locomotive in road service, be of equal value? Steam locomotives are generally much less regular in their assignments than are the Diesel-electric locomotives in road service. On some railroads work may be done on them in three or four different terminals, as called for on the work reports of the engineman. In such cases the supervisors at none of these terminals have any background knowledge of the reports rendered at the ends of preceding trips in other terminals. Such a background knowledge of the immediately preceding maintenance history would be invaluable in getting at the bottom of recurring trouble which occasionally develops, sometimes ends disastrously.

A number of crown-sheet failures are recalled in which the reports of the investigation by the Bureau of Locomotive Inspection shows persistent recurrence of work reports indicating improper functioning of some part of the boiler-feeding or water-level recording equipment day after day by different enginemen reporting in at different terminals. The constant recurrence of these reports, had the fact been known to the various terminal supervisors, might have led some of them to take a sufficiently serious view of the situation indicated by the work report to get to the bottom of the condition which ultimately became a contributory factor in a crown-sheet failure, with loss of life and heavy property damage.

Not many other classes of work reports involve the matter of safety to the same extent as those pertaining to the boiler and its appurtenances. But the frequent repetition of superficial repairs can be wasteful on other parts of the locomotive. Would not the log accompanying each locomotive be a definite stimulus to more effective and less wasteful work on steam locomotives at engine terminals.

IN THE BACK SHOP AND ENGINEHOUSE

Flue Cut-Off Saw

An efficient and speedy saw has been built by the forces of the New York Central at the West Albany locomotive shop for use in the boiler shop in cutting off locomotive tubes and flues to the lengths required for safe ends. A 5½-in. flue can be cut in 20 seconds on the saw, with smaller sizes cut in considerably less time. The saw is rigidly mounted on a heavy base and is driven by a

Vee-shaped jaws hold flues and tubes firmly in place while they are being sawed—The jaws are pneumatically operated

The combination of an air and an hydraulic cylinder permits slow, controlled advance of the saw blade into the work—Handwheel control is used to adjust the saw carriage for the various sizes of flues and tubes to be cut

7½-hp. motor which has a speed of 1,200 r.p.m. The saw blade is driven by this motor through five Size B vee belts and the peripheral speed of the blade is 3,600 rp.m. The sawblade spindle is mounted in ball bearings.

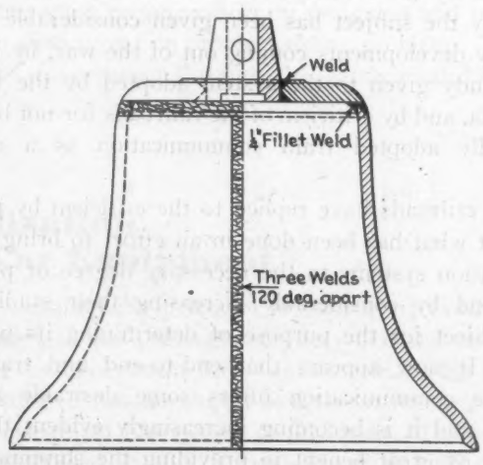
Flues and tubes are held firmly in place for sawing by two pneumatically operated vee-type jaws. Considerable difficulty was experienced with saw breakage when the saw was first designed because the blade was advanced to the work by an air cylinder. This proved to be too fast and the mechanism was re-designed so that an air and an hydraulic cylinder operate together as the saw blade is advanced by the opening of the air valve. The use of the hydraulic cylinder cushions the effect of the sudden opening of the air line and gives a slow feed of the saw blade into the work. The piping is so arranged that a quick release is obtained when a cut is completed.

The saw blades used are 26 in. in diameter when new and can be resharpened until they reach 22 in. in diameter. They are not undercut but are ground on line with center. A handwheel-control is used to adjust the saw carriage for the various sizes of tubing to be cut.

Welded Locomotive Bell*

Welded wrought-steel bells for freight and yard locomotives replacing cast-bronze bells are made by the Pennsylvania at a saving of about one half the cost and 36½ lb. in weight per item.

The body of the welded bell consists of three pieces of formed steel, ⅜ in. thick beveled at the main seams to present a 60-deg. vee angle at the joints. Shielded arc electrodes for mild steel are used throughout to produce smooth, uniform weld beads. The top section of the bell is made up of a central tubular piece 2½ in. in diameter tapered toward the top and $2\frac{13}{16}$-in. in length. A circular steel plate of 1 in. thickness is welded inside and out to the base of the central top section and it is first beveled at a 45 deg. angle to make a double beveled joint. The flanged body of the bell is joined to the top assembly by a ¼-in. fillet weld on the inside. The outside edge



A welded-steel locomotive bell (Patented)

of the body is beveled at 45 deg. and butt welded. After the assembly has been completed it is passed over dies to secure uniform contour.

To establish the comparative sound level intensities of a welded wrought-steel bell and a standard cast-bronze bell, a test was arranged in which one bell of each material was mounted on its regular yoke, and struck by a

* From a field report received by the Lincoln Electric Co., Cleveland, Ohio.

eel ball 2 in. in diameter rolling down a trough sloped 57 deg. The striking point of the ball was on the ared portion of the bell at a point corresponding to the triking point of the bell clapper.

Sound intensities were determined by means of a Type 59-A sound level meter, in decibels. The meter was tioned 183 ft. from the nearest side of the bell.

	Range of Sound Level Intensities, Decibels		
Type	Minimum	Maximum	Average 25 readings
Welded wrought steel	75.50	78.25	76.97
Standard cast bronze	75.00	78.50	76.81

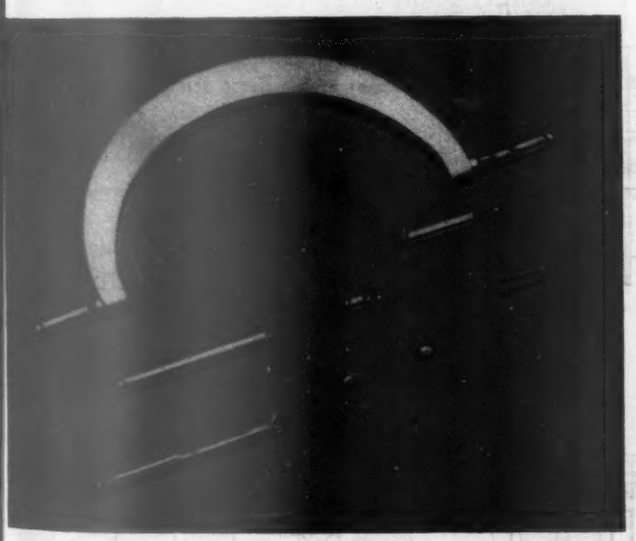
There is a close similarity between the sound levels or the two bells. More accurate determinations would equire the testing of several bells of each material, but s the two bells tested were representative, the figures fford a fair comparison. The sound level does not de- ermine the tone quality, that is very different by reason f the difference in the elastic modulus of the two ma- erials.

The wrought-steel bell described above is covered by United States Letters Patent number 2,322,021.

Micrometer for Measuring Large Bores

By D. E. McDonald

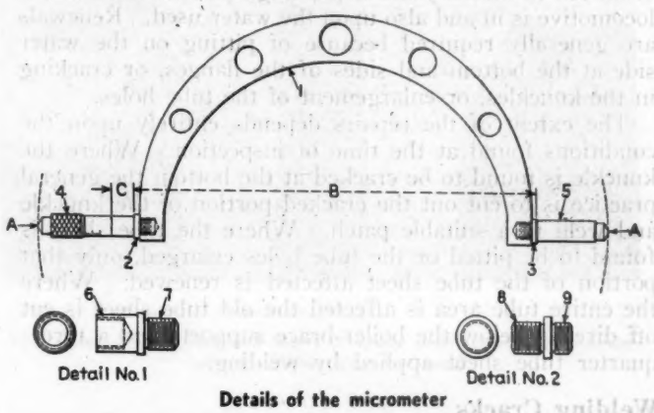
In measuring the diameter of large bores, such as locomotive cylinders, locomotive valves, air pumps, etc., it is very difficult to measure accurately unless the boring bar proper is removed. As most of this work is done on a horizontal boring machine, the removal of the bar is not practical. The measurement of the bore can be taken by measuring from the inside of the bore to the outside periphery of the boring bar, and this measurement is then multiplied by two and the diameter of the bar added to get the required dimension. This method is not always reliable because many bars have been deformed or bent and, in practically all cases, they do not run exactly true.



Micrometer for use in large bores when the boring bar is in place

With the instrument shown accurate measuring is possible without disturbing the bar. A frame can be made from almost any material and should have several holes drilled in it to effect weight reduction. A coupling is fitted at each end of this frame, details *1* and *2*. On the coupling shown in detail *1* there is a male and a female thread. The female thread *6* is to be 5/16 in., 48 threads per in., and the male thread *9* is also to be 5/16 in., 48 threads per in. It is optional as to the thread chosen for *7* and *8*. The couplings are shown in place at locations *2* and *3*.

After the frame and couplings have been constructed and assembled, a pair of 680 Lufkin micrometers consisting of a head *4* and a rod *5*. Various rod combinations can be made up to increase the range of this micrometer, and points of contact are made with the bore as shown at *A-A*. After a measurement is taken, the exact size can be determined by using a pair of outside micrometers of a Vernier caliper. However, if the distance *B* plus *C* is precisely known this micrometer will produce accurate readings without further comparison.



Details of the micrometer

It is suggested in manufacturing the frame that care be taken to choose a material heavy enough to withstand any deflection which may develop by excessive pressure exerted on the micrometer screw.

Locomotive Boiler Questions and Answers

By George M. Davies

(This department is for the help of those who desire assistance on locomotive boiler problems. Inquiries should bear the name and address of the writer. Anonymous communications will not be considered. The identity of the writer, however, will not be disclosed unless special permission is given to do so. Our readers in the boiler shop are invited to submit their problems for solution.)

Overcoming Water Surge In Tender Tanks

Q.—Our Mikado type locomotives are equipped with 10,000-gal. tender tanks. These are the typical rectangular shaped tanks with vertical crosswise bracing. The splash plates are hard to maintain due to buckling, cracking and loose rivets.—F. E. D.

A.—Such troubles are generally caused by the surge of the water in the tank and any change that reduces the blow on the plates due to the surging should help this condition. If the present construction of the tank will permit, plates should be run longitudinally in the tank dividing the width of the tank into three parts, thus forming boxes on the right and left sides of the tank. Sufficient holes should be provided in the plates for the proper circulation of the water. By dividing the tank into box sections, the surge of the water against any one

plate is materially reduced and this should be reflected in reduced necessity for maintenance and repairs.

Renewing Front Tube Sheets

Q.—Should the front tube sheet of a locomotive boiler give over ten years of service before being renewed? What determines the extent of the repairs to be made to a front tube sheet at shopping?—F. A. F.

A.—The average life of the front tube sheet varies from ten to fifteen years depending upon the service the locomotive is in and also upon the water used. Renewals are generally required because of pitting on the water side at the bottom and sides of the flanges, or cracking in the knuckles, or enlargement of the tube holes.

The extent of the repairs depends entirely upon the conditions found at the time of inspection. Where the knuckle is found to be cracked at the bottom the general practice is to cut out the cracked portion of the knuckle and weld in a suitable patch. Where the tube sheet is found to be pitted or the tube holes enlarged, only that portion of the tube sheet affected is renewed. Where the entire tube area is affected the old tube sheet is cut off directly below the boiler-brace supports and a three-quarter tube sheet applied by welding.

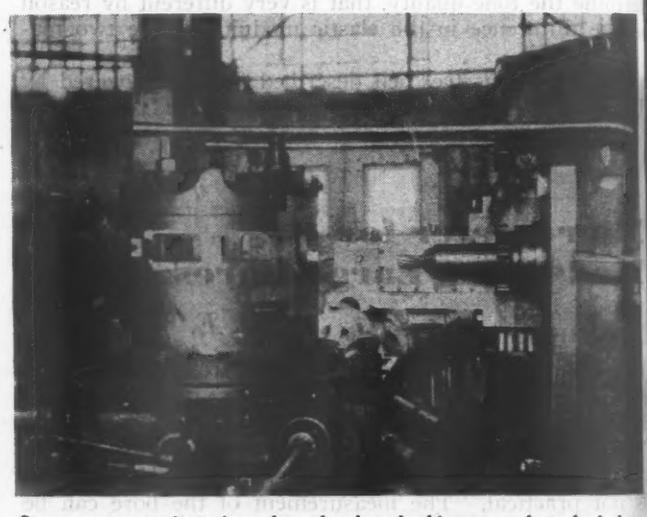
Welding Cracks Under Boiler Patches

Q.—In applying boiler patches to the cracked shell of a locomotive boiler, should the crack be veed out and welded prior to applying the patch?—M. I. F.

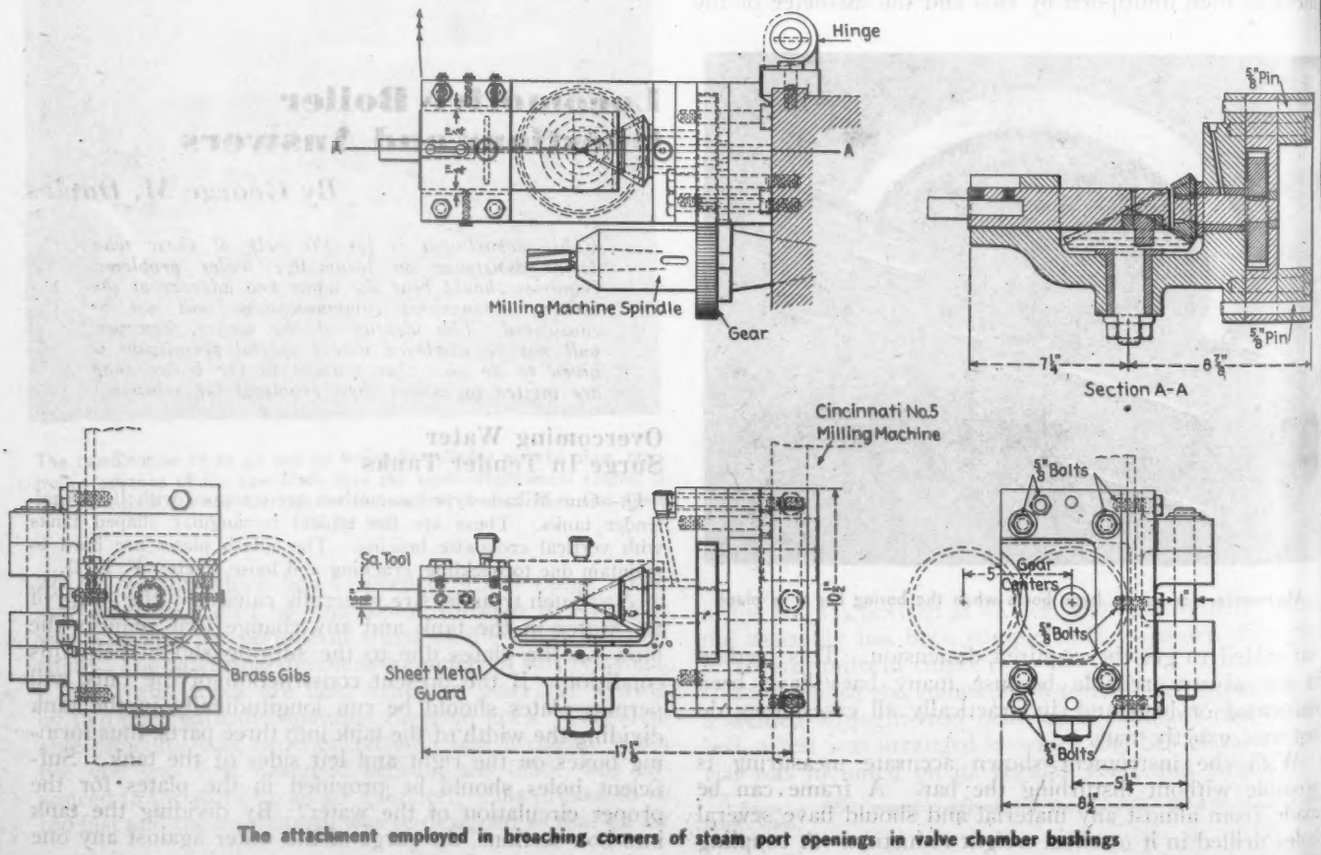
A.—The general practice is to drill a ¼-in. hole in the shell at each end of the crack before applying the patch. Welding the crack in the shell before applying the patch could only be considered as a seal for the crack and could not be considered as strengthening the shell, therefore, the efficiency of the patch would have to be the same, whether the crack was welded or not. However, the welding of the crack would set up internal stresses in the shell course which, if not stress relieved, would be detrimental to the plate and for this reason the practice of welding cracks in boiler shells is not recommended.

Broaching Steam Port Openings

The New York Central has developed a broaching attachment for use on a No. 5 Cincinnati milling machine which is employed in squaring the inside corners of steam ports in piston valve bushings. Mounted on the side of the machine on a hinged joint, the attachment can be



Steam-port openings in valve chamber bushings are broached by means of this attachment to a standard milling machine



The attachment employed in broaching corners of steam port openings in valve chamber bushings

wung clear of the work table when milling operations re going on. A special mounting on the table of the achine allows the bushing to be rotated and positioned or the broaching of each corner with a minimum of set-ing-up time. The broach is operated through a series f gears which mesh with a gear mounted on the regular illing-machine spindle. A cam is employed to obtain he forward and backward motion for the tool holder.

Short Coal Tender

The impossibility of closing enginehouse doors at the DuBois shop of the Baltimore & Ohio if tenders were ttached to locomotives led working forces to develop the emergency tender which is illustrated. Mounted on an old car truck it looks very much like the end section of

Coal tender used when firing locomotives in enginehouses where stalls will not accommodate regular tenders

a hopper car but it is built with a platform at the locomotive deck level and has steps at the side for the safety and convenience of workmen. The use of the tender during the colder months has made working conditions very much better for the workmen while still permitting locomotives to be fired in the house.

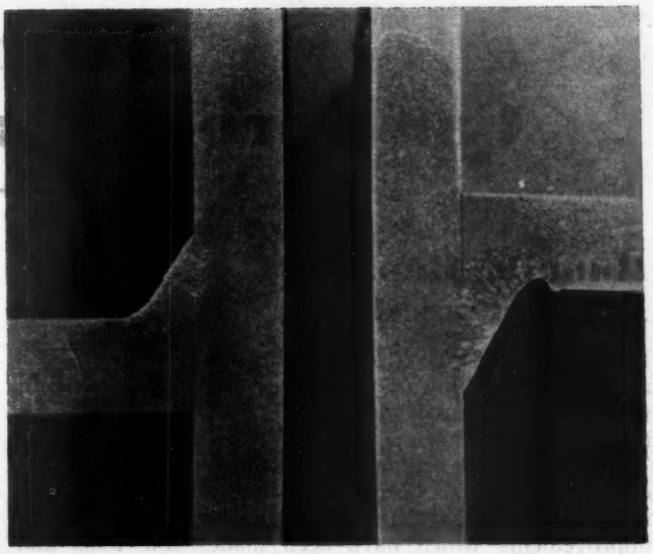
Questions and Answers On Welding Practices

(The material in this department is for the assistance of those who are interested in, or wish help on problems relating to welding practices as applied to locomotive and car maintenance. The department is open to any person who cares to submit problems for solution. All communications should bear the name and address of the writer, whose identity will not be disclosed when request is made to that effect.)

Undercutting

Q.—What are the usual causes of undercutting?

A.—Undercutting may result when excessive welding currents are employed; when the manipulation of the rod is at fault; or, when attempting to weld in a position

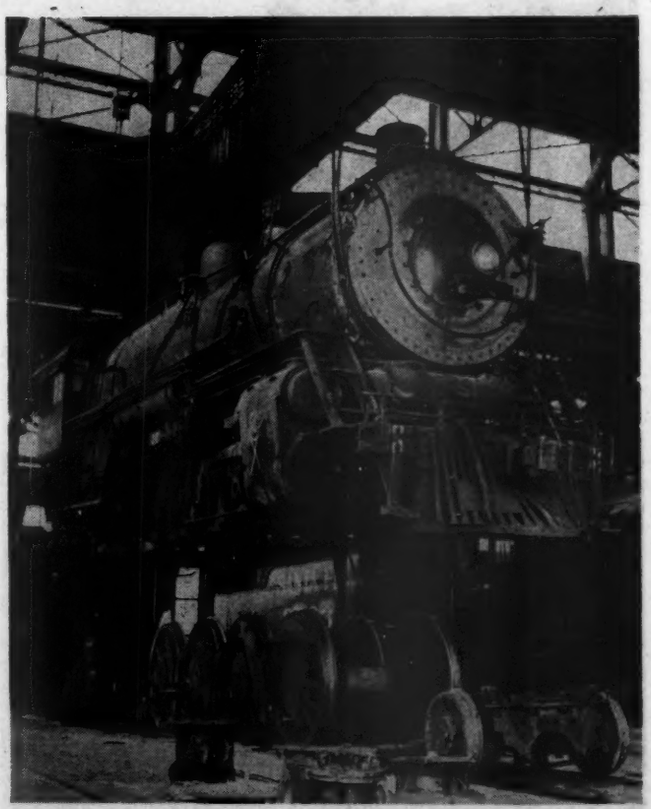


Courtesy Westinghouse Electric & Mfg. Co.

Left: Good fillet weld which shows complete penetration but no undercutting—Right: Undercut weld

for which the electrode was not designed. Moderate welding currents should be employed and the speed of travel should not be too fast. Too large an electrode should not be used for any job because, if the puddle of molten metal becomes too large, undercut may result. Excessive weaving is another cause and should be avoided although a uniform weave will aid greatly in preventing undercut in butt welds. If an electrode is held too near the vertical plane when making a horizontal fillet weld, undercutting may occur on the vertical plate.

* * *



Unwheeling a locomotive at Santa Fe shops preparatory to general overhauling

With the Car Foremen and Inspectors

Running Repairs At Spencer Shop

Running repair tracks on all railroads have been operating up to the limit of their capacities practically all of the time since the beginning of the war. The repair track of the Southern at Spencer, N. C., is no exception. This track, located at one of the busiest division points on the railroad, has been able to meet all demands made upon it but probably could not have done so except for improvements which have been made, new tools and equipment which have been purchased and the ingenuity of supervision in developing methods which reduce physical effort on the part of employees and speed output.

The wheel-changing track at this point was described in the August, 1944, issue of the *Railway Mechanical Engineer*, page 365. Numerous other features also contribute to the overall efficiency of repairs at this point through which most of the northbound and southbound traffic carried by the Southern in its eastern district passes. The backbone of the yard is a concrete runway 1,600 ft. in length and 12 ft. wide. The two tracks along this runway are the ones used for repair work other th wheel changes. On the off-sides from the runway t working areas consist of well-packed cinders which pr vide good drainage and give the workmen satisfacto working conditions. However, it is the concrete ru way which has been especially valuable in expeditin repairs to cars because materials are easily and rapid transported to the points where needed. Buda Cho Boys have replaced the old hand truck and walkin method of obtaining materials. Used in connection wit these are service wagons which can be pulled from poi to point along the repair tracks as the gangs move fro car to car. There are three of these wagons, one fitte out to carry the various sizes and types of bolts and nut lock nuts, cotters, nails and keys which are ordinari required in repairs to cars. Another carries spring snubbers, brake shoes, hangers and other heavy par and the third is employed for the transportation of too which are too heavy or awkward to be moved from loc tion to location by hand. The maintenance of the tw sub-storehouse wagons is especially important inasmuc as the regular storehouse is more than a half mile fro the farthest end of the repair track. As needed th carts are pulled to the storehouse by a shop truck an restocked. The time-saving factor in this instance important but it is also true that the men working o the track appreciate having the materials at hand wit which to do their work.

Material deliveries are made by Buda Chore Boys

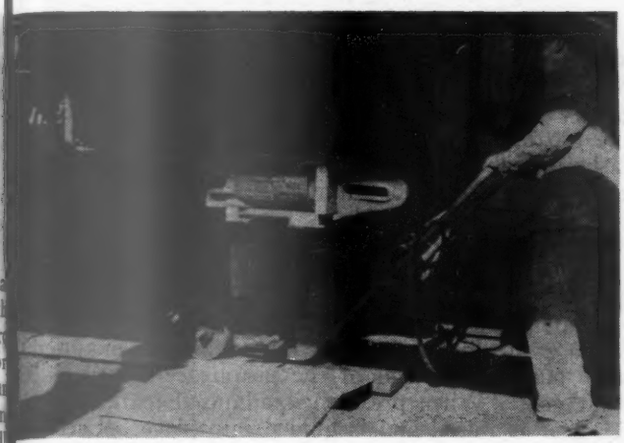
A shop truck can move supply trucks to points where work is going on—They are supplied with all parts commonly required in car repairs

Adequate Jacking Facilities

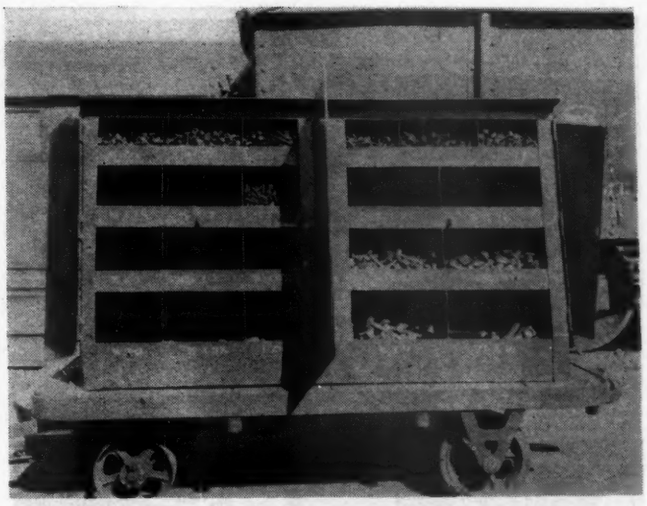
In addition to 50-ton air-operated car jacks used o the wheel-repair track the Spencer shop is equipped wit an adequate number of 20-ton hydraulic empty-car jacks and with necessary hydraulic journal jacks. The me chanic whose duty it is to examine and replace bearings uses a cart on which there is space for one empty-car jack and one journal jack. The cart is also equipped with a car-brass trimmer which is a hand-operated shaper designed to trim the edges of bearing linings and reshape the original oil grooves on bearings that might be replaced, as well as those in a partially overrun condition. The work of trimming lining edges and reshaping the oil grooves is done in about two minutes when the bearing is removed for inspection. The bearing is then returned to the same journal on which it has run-in and has a full seat. The mechanic engaged in this work stated that the use of the hydraulic jacks and the ease of operation of the brass trimmer had enabled him to increase his day's output by about 40 per cent without any feeling of increased fatigue at the end of his shift.

Home-Made Aids

In addition to the new equipment which has been purchased for use at this repair point there are a considerable number of home-made devices which serve to make work easier for the workmen and increase output. Two styles of box-car door-hanging devices are employed, one for use where compressed air is available, the other for use in locations where the air supply is at some distance from the work. The air-operated door hanger is mounted on rubber-tired wheels and consists of a piece of 4-in. tubing for the barrel with a tight-fitting piston having a



-operated hoist for placing draft gears in position between car sills



This movable storehouse is stocked with all commonly needed sizes of bolts, rivets, nuts and washers

journal jack and an empty car jack are used by the mechanic who replaces bearings

Lining edges are trimmed and oil grooves reshaped on journal bearings before they are replaced on the same journals from which they were removed

A portable hand-operated door placer which can be used at any repair location

Parts required in truck repairs are stocked on this supply cart

Air-operated door placer which is easily moved about and can be employed readily in narrow aisles between working tracks

travel sufficiently long that either top- or bottom-handle doors can be raised into position to be entered into the door track. When using the top handle on a door a short length of chain, with a flat hook, is all that is required to raise the door and hold it in position. Bottom-handle doors require the use of a sling to prevent the door from slipping or falling back on the operator. When air is admitted to the cylinder the door is raised to the proper position and entered into the door track by a workman on the roof of the car. The piston fit has been made tight enough so that leakage of air does not affect the operation in the few minutes it requires to enter the door properly on the tracks. After the door is so entered the fittings at the bottom are bolted in place before air pressure is released.

The manually operated door hanger is made of welded steel piping and is long enough to lean against the roof of a car. In this case the flat hook is fastened to the end of a steel cable which runs over a pulley located near the top of the hanger. The cable, at its other end, is fastened to a shaft which is crank-operated to wind the cable and raise a door into position. The rigging for top- or bottom-handle doors is the same as in the case of the air-operated hoist. This device is light enough that two men carry it readily to any point where it is needed.

Draft gears are removed and applied by the use of a carriage on which an oil air cylinder has been mounted. A table built on the end of the piston accommodates the draft gear. When pressure is admitted to the cylinder the gear is raised and is guided into place between the sills and held there until necessary work has been completed. The same unit is used when gears are removed and it has eliminated a potential source of accidents.

Other special jigs and fixtures are in use in the planing mill and the wheel shop at this repair point and all serve to increase shop efficiency while reducing repair time and physical effort on the part of the workmen. Hand tools are in good supply and are kept in good condition to minimize the chances for accidents.

Other changes in the plant layout and tooling are contemplated which will add still further to the speed and quality of output.

Swivel-Type Car Shop Trestle

A new swivel-type trestle, or metal "horse," designed for use in supporting freight car bodies during repair operations, has been developed, as shown in the illustration being installed at the North Little Rock, Ark., car shops of the Missouri Pacific.

The trestle consists in general of a cylindrical post about 8 in. in diameter, set firmly in a concrete block in the car shop floor, with a substantial cast or welded steel

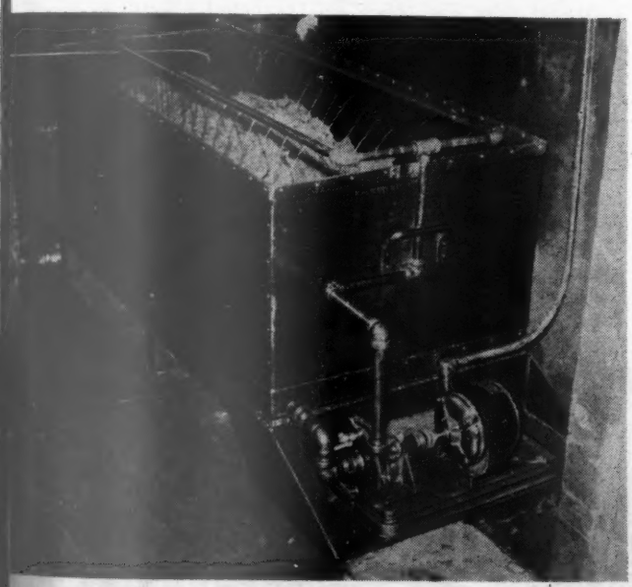
Freight car shop trestle in use (left) and with supporting arm parallel with the track (right) while the car end is being jacked up

bracket arm arranged to swivel to clear the track when not in use and yet be easily swung into place at right angles with the track and having the end extend under the car side sill. With one of these trestles at each corner of the car, therefore, the car weight is supported on a rigid construction which leaves the floor under the car entirely free from obstructing blocks or "horses."

The general method of construction and use of the new trestle is apparent. In the accompanying photographs the view at the right shows the end of the car being raised from the truck with two air-operated jacks, one on either side, the arm of the trestle being parallel with the track. As soon as the car body is raised high enough, the trestle arm is swung under the side sill as shown in the left view, the jack lowered, transferring the weight to the trestle arm and the truck removed. This particular view shows the jack still in place, but it can of course be removed and the entire weight supported on the trestle, in case the jack is in the way and additional floor space is required.

Journal Packing Saturator

The requirements of Interchange Rule 66 that journal packing in storage containers must be turned periodically or else that the oil draining to the bottom of the container must be drawn off and poured over the packing at intervals has led to the development of a storage container



A pump drives the oil which collects in the bottom of this tank through perforated oil-distribution pipes over the top of the journal packing

on the Baltimore & Ohio which uses a pumping arrangement to keep packing saturated. After oil has drained through the packing to the bottom of the storage tank it passes through a centrifugal pump which forces the oil through piping to the top of the tank where it is discharged through perforations in the pipe. These perforations are so arranged that the oil spray is directed over the entire mass of packing and serves to keep it properly saturated in accordance with the rule requirements. Hand pouring is done away with entirely and greater uniformity in oil distribution is obtained.

Decisions of Arbitration Cases

(The Arbitration Committee of the A. A. R. Mechanical Division is called upon to render decisions on a large number of questions and controversies which are submitted from time to time. As these matters are of interest not only to railroad officers but also to car inspectors and others, the Railway Mechanical Engineer will print abstracts of decisions as rendered.)

Repacking Stencil Misread

On October 27, 1942, the Seaboard Air Line repacked journal boxes on PFE car 91399 rendering a charge of $3.70 with the repair card showing old date markings of "1-19-41 PRR." The Pacific Fruit Express Company submitted the Pennsylvania's repair card of January 19, 1942, as evidence that the journal boxes had been repacked on that date and were, therefore, not due for periodic attention in October of that year. Evidence was presented to show that the car was never in the hands of the Pennsylvania in January of 1941 so that the presumption was that the old markings had been misread by the claimant road. The Seaboard Air Line did not admit that the stenciling was misread and claimed that its repair card should serve as evidence of improper stenciling by the Pennsylvania. Arbitration case 1278 was cited by the Pacific Fruit Express and request was made that the charge should be reduced to one half of the allowance specified in Rule 101, per Section (g) of Rule 66. The S. A. L. contended that the case cited was not applicable because the decision was rendered before the inclusion of paragraph (h) in Rule 60 and Interpretation 1 of Rule 66.

The Arbitration Committee found on November 16, 1943, that, "The evidence submitted indicates the car had been previously repacked on January 19, 1942, and was so stenciled. The charge for repacking journal boxes should be confined to one-half of the allowance specified in Rule 101, per Section (g) of Rule 66." *Case No. 1800, Pacific Fruit Express Company versus Seaboard Air Line.*

Discretion Limited When Substituting Couplers

The Kansas City Southern removed a 6-in. by 8-in. by 6-in. Type D coupler and a non-A. A. R. standard cast-steel yoke having a 9½-in. by 18½-in. pocket designed with a slot for a 1½-in. by 6-in. horizontal key from LENX car No. 457 because the parts were broken. They were replaced with a 5-in. by 7-in. by 9⅛-in. Type E coupler and a new A. A. R. standard wrought-iron yoke. The Champlin Refining Company took exceptions to the repair and requested the issuance of a defect card for labor only for correcting the wrong repair. The railroad contended that the repair was proper and refused to issue a card. The claimant contended that Rule 17, Paragraph (c-2), Item 16, supported its position and said that Rule 17, Paragraph (c-1), relied upon by the railroad, was not applicable because the coupler size referred to there was different than the coupler removed from the car. It also directed attention to the fact that no credit was allowed for the differences in the weights of the parts involved.

In a decision rendered April 13, 1944, the Arbitration Committee held that, "The repairing line did not comply with Rule 17, Paragraph (c-7), as outlined in third paragraph on Interpretation No. c-2 of this rule; therefore, contention of the Champlin Refining Company is sustained." *Case No. 1801, Champlin Refining Company versus Kansas City Southern.*

Battery Charging "Assembly-Line"

The Army's method of solving a power supply problem similar to that of railroads at freight transfer points

MAINTAINING full electrical charge in storage batteries for a fleet of 80 lift and hoist trucks has become an operation that assumes assembly line character at Benicia, Calif., Army Arsenal. The trucks, most of which are of the lift or tiering type, are part of the vital repair operations now in progress on battle damaged war equipment that passes daily through repair shops of one of the oldest military bases in the United States.

The three motor generator sets behind the control panels shown in the other illustrations

A sufficient number of batteries are maintained in service to insure that trucks are not tied up for want of a charged battery. The batteries used to power the trucks are of the Edison industrial type. Weighing over 1,800 lb. each, the 28-cell batteries enable the trucks to move at five miles an hour about the base with loads ranging from 3,000 to 7,000 lb. The battery units are brought into the recharging room on a special truck equipped with a hoist. To assure peak operating efficiency, all batteries are recharged on a rotating schedule at the end of each 8 hours of service. During the operating period, it is assumed that the truck has traveled about 30 miles in addition to the lifting and stacking work.

To supply sufficient d. c. power to recharge the batteries, three Westinghouse synchronous motor-generator sets, rated at 75 kw. each, have been installed. Control is fully automatic and is handled through Westinghouse cubicle switchgear, designed to include three motor-control, three generator-control and nine charging-control units. The incoming 2,300-volt line is fed through a primary cubicle equipped with a Westinghouse De-ion oil circuit breaker. Five outgoing circuits on each charg-

Interior of the charging room showing a battery being flushed with a gravity type flushing device—In the background may be seen two motor control panels, three generator control panels and nine charging panels—Not shown at the left a primary control panel and one motor panel—Connections from the charging panels to the batteries are made through underground circuits

Batteries are moved from the charging room by a highway truck equipped with a short section of monorail, a chain hoist and an equalizer bar

ng control panel permit simultaneous recharging of 45 of the storage batteries.

When the load on one of the charging generators reaches a maximum rated capacity of 75 kw., the automatic control cuts in the number two motor-generator and when it reaches 150 kw., set number three is brought into service, providing a maximum recharging capacity of 225 kw. The controls permit any of the machines to be used as number one, two or three generator. Conversely, as the load falls, the generators are taken off the line one at a time and when the last battery on the line has reached its full charge, control relays act to shut down the charging equipment. The automatic control also guards against overcharging the storage batteries and provides for high charging efficiency.

Quick Heat For Soldering Irons

The soldering-iron heater shown in the illustration was made in the Spencer, N. C., shops of the Southern and has proved highly effective. It can be used on any size iron up to 1¼ in. in section and the heating time, depending upon the size of the iron, varies from 7 to 52 seconds.

The perforated housing which forms the base of the heater measures 12 in. by 10 in. It is 9 in. high and contains a type H, two-coil, single-phase transformer. The primary voltage is 220 and the full load primary current is 35 amp. The open-circuit secondary voltage is six; no measurement has been made of secondary current. The jaws between which the iron is placed are carbon blacks and heating is effected partly by conduction in the iron itself and partly by the heat developed through contact resistance. A pressure of from 3 to 8 lb. is applied to the contacts. The hinge at the left of the upper contact is shunted by a flexible copper ribbon. No control device is used, the amount of current flow being governed by the transformer characteristic and the secondary resistance.

Light pressure on the handle causes a heavy current flow with sufficient contact resistance to cause quick heating of the iron

COOL WORK

by Walt Wyre

NED SPARKS, electrician for the S. P. & W. at Plainville, had never been to Hillside; he hadn't even thought of going there, until one morning early in February the master mechanic sent for him to come to the office.

"Sit down, Sparks," the master mechanic invited. "How would you like to go to Hillside and do a little work?"

"Don't know," Sparks replied. "I've heard it's the coldest place this side of the North Pole. What kind of a job do you want me to do?"

"Just wire the roundhouse for lights and put in a couple of outlets for electric welders. There are twelve stalls in the roundhouse," the master mechanic added.

"What about material?" Sparks asked.

"Everything is there, been there about six months. The signal supervisor ordered the material last spring. It was originally planned for signal men to do the work but they didn't get around to it and since then the mechanical department has taken over all of that work, you know."

"Isn't there an electrician at Hillside?" Sparks inquired.

"Yes, but since all of the mines started going full blast and the government built a big camp near there the electrician has had his hands full keeping things going. I don't want to send one of the new electricians up there, I don't know how they would get along with the work. It's a pretty tough place to go, not much place to live, and cold as blazes. Of course, if you don't feel like you can stand it, we'll try to get some one else, or maybe contract the job."

"Where would I live?" Sparks' tone indicated that the master mechanic had slightly ruffled the electrician's temper, as no doubt that worthy official had intended.

"Well——" the master mechanic hesitated, "there's a hotel, or if your wife wants to go and do your cooking, the railroad has leased some trailer houses from the Government for employees. You can live in one of them, if you like. You can work all of the hours you feel like on the job, long as it doesn't run into double time." The master mechanic added the last when he saw Sparks was wavering.

"O. K.," Sparks agreed. "I'll go, but what about a helper? I couldn't take Red—I mean Miss Malone." Sparks was referring to the redheaded young lady that for the past months had been acting as his helper.

"The foreman at Hillside will give you a helper and the electrician there can help, too. I'll wire Rankin—Bob Rankin is the foreman—to have a helper ready when you get there. When can you go?"

"Day after tomorrow," Sparks said, "and if my wife goes, as I imagine she will, I'll want to drive. What about gasoline?"

"Go to the ration board and get a blank and fill it out. I'll tell the chief clerk to O. K. it for you."

THAT afternoon when Sparks reached home he asked his wife, "Got any red flannels?"

"Red flannels! Ned Sparks, let me smell your breath! What are you talking about?"

"Well, last summer you wanted to go to the mountains and didn't get to go. Here's your chance." Sparks then explained the situation to her.

"It's a darned poor time to go to the mountains, but guess it'll not be much worse than Plainville the way the wind blows in February and March."

It is about three hundred and seventy-five miles from Plainville to Hillside. The first two hundred on the plains, then the mountains start. The last seventy-five miles of the highway is all mountains. Hillside lies on the west side of Hurricane Pass. The mountain branch of the S. P. & W. follows one side of Beaver River, the town of Hillside is on the other—about two miles long and one block wide. Towering rock walls of the mountains limit the width of the town so that in most places the back yard stands on edge, hundreds of feet above the eight-thousand-foot altitude of the town.

Sparks and his wife drove about two hundred and fifty miles the first day and reached Hillside about one p. m. the next day. It didn't seem cold in the car and not so terribly cold when they first got out, but it wasn't long until both were shivering like Jell-O during an earthquake. They spied a small restaurant and rushed in. There was a large coal heating stove in the center of the room. They both saw it and went to it. The stove was barely warm.

A lady, evidently the one who ran the place, came over and said, "It's warmed up, so I let the fire go down. I'll put in some coal."

"How cold is it?" Sparks inquired.

"Oh, about fifteen below, I imagine," the lady replied. "It was twenty-two below when I looked at the thermometer this morning."

Sparks and his wife started shivering again.

After they had eaten they got in the car and drove to the passenger station to see the agent who had charge of the trailer houses. The agent gave them the key to trailer house No. 13 and showed them where to get oil for the heater.

The next four weeks in the trailer house is best omitted. Mrs. Sparks had planned to buy one after the war, but is definitely no longer a prospect. In fact, any salesman attempting to sell her a trailer house would be, as Damon Runyan would say, "more foolish than somewhat."

After a chilly night on a hard bed—they bought a mattress next day for which Sparks could find no place on his expense account—Sparks went to the roundhouse and reported to Bob Rankin. The foreman was too busy with problems of his own to worry about wiring the roundhouse that had been getting along as it was for years.

"Find Alex Spann," Rankin told Sparks. "He's the electrician and knows all about where the material is and how the job is to be done."

"What about a helper?" Sparks inquired.

"Haven't got anybody today. I'll see if I can't arrange for one in the next day or two." The foreman's manner indicated that the subject was closed, for the time being at least.

SPARKS found the electrician mentioned on top of one of the big Mallets working on a dynamo. The dynamo was running too fast and couldn't be properly adjusted because the governor valve seat was badly cut and allowed sufficient steam to leak by so that it wouldn't regulate. Alex had some sheet lead which he was using to fill the grooves in the valve seat.

Sparks climbed up on top of the locomotive and introduced himself, then noticing what Spann was doing, asked, "Is the seat cut too badly to ream?"

The bit extension was a bit limber but with Spann half way up the ladder it worked pretty well . . .

"Haven't got a reamer," Alex told him, "and no repair parts. Lead will hold for a trip or two then start leaking again. I've had parts ordered two or three months. Be with you in a minute and show you where material for wiring the roundhouse is."

The material was stored in a shack that had once been used as a water service shop and was located over three hundred yards from the roundhouse. All conduit was half-inch and the wire number fourteen. There were besides twelve four-circuit switches and a lot of secondary racks and insulators.

"What are the racks for?" Sparks asked.

"They go on posts on top of the roof," Alex explained. "The posts are already set up. I've got a sketch somewhere that gives a general idea. The conduit is to be laid on the roof, too."

"I don't understand why there isn't any three-quarter conduit, especially to run down to the switches," Sparks said. "Using half inch, it'll take one run of conduit for the line and one run for the branch circuit wires, then there'll be five wires in the pipe, which, if I remember, is one too many."

"That's what's here," Alex said, "and I guess that's what you'll have to use. The reflectors are in those big boxes—should be one hundred and twenty of them—100-watt angle reflectors."

Sparks groaned. He was beginning to wish that he had stayed in Plainville.

AFTER the material had been checked, Sparks and the other electrician returned to the roundhouse. As they walked through the house, Sparks was figuring how to go about running conduit for lights and switches, and any way he could figure it would be quite a job. The roof was high and evidently built to stand a heavy accumulation of snow. Heavy beams at least sixteen inches square supported roof rafters and were placed over supporting posts where lights were to be.

"Going to take a lot of bending to get conduit down to the posts," Sparks observed, "and, by the way, it's going to take a long ladder to reach to the roof. Is there one around here?"

"The B&B gang has an extension ladder, but I don't know where it is," Alex replied. "Can't you bore the holes for the conduit from the top of the roof?"

"Afraid not," Sparks squinted one eye like he was aiming a gun at a squirred in a tree, "the way those timbers are laid it would be quite a problem to locate the holes on top of the roof and you might notice that the posts seem to have been spaced by guess and by gosh. Must have been built like King Solomon's temple, without hammering and sawing, but didn't fit quite so nicely." Sparks grinned, then added, "Boring about ninety one-inch holes in that roof is going to be quite a chore. If you'll help me locate that extension ladder and set it up, I'll get started."

The ladder lacked about four feet of being long enough to reach the beams supporting the rafters and when set against the post, Sparks was in a very awkward position for boring holes. He bored two and decided there must be some easier way of earning a living than hanging like a monkey trying to bore holes through three inches of tough timber.

Sparks next tried measuring and boring from the top, as Spann had first suggested, but that didn't work out. It would have been O. K. if posts and timbers had been

in line, but they weren't. He bored three holes all in wrong places and gave up.

"Maybe a bridge auger would be long enough so you could reach it better from the ladder," Spann suggested.

Ready to try anything, Sparks followed the suggestion. The auger was long enough, but there wasn't room for the sweep of the auger. Sparks was standing on the ladder looking as disgusted as a Marine that had landed and found no situation to take in hand, when Spann said, "If that auger was a little longer it might work."

Sparks suddenly started climbing down the ladder. "Let's make a long one," he said, "long enough to stand on the ground and work it."

"How?" Alex wanted to know.

"I'll show you," Sparks replied. "Can you find some solder and an acetylene torch?"

While the other electrician was getting solder and a torch, Sparks went to the shack where the material was stored and returned with three joints of half-inch conduit. He screwed two lengths of the conduit together, then cut a piece about five feet long and bent a crank on one end of it.

"Now what?" Spann asked as he came up pushing an acetylene outfit mounted on a two-wheeled truck.

Sparks took a one-inch bit from his tool box, then he plugged one end of a half-inch conduit coupling with a piece of asbestos and centered the square end of the brace in the coupling.

"Melt some solder and run in the coupling to hold the shank of the bit," Sparks told Alex.

When that was done and the coupling cooled, Sparks removed the asbestos plug from the coupling and screwed the improvised chuck on the end of the conduit.

"It's slightly limber, but maybe it will do," Sparks said.

"Maybe if I will get about half way up the ladder and steady the pipe it will work better," Spann said.

"That's O. K.," Sparks said when the first hole was bored. "If you'll help, we will get all the holes bored today at that rate."

Spann helped most of the day but had to leave and do several odd jobs on locomotives and Sparks had some difficulty handling the long handled auger alone, but by working until six o'clock the holes were finished.

Sparks, dog tired and hungry enough to eat the whistle off a peanut roaster, shucked off his overalls and started walking rapidly towards "Hell Haven," as the Missus had nicknamed the trailer house. He hadn't walked far when he began to breathe hard and was forced to slow down. The altitude was showing its effect on his wind. About that time Sparks began to feel the cold biting through his heavy clothing. Working inside the roundhouse he had not noticed the frigid air that was like that inside a frozen food locker room and almost as little wind. When Sparks reached the trailer house his legs were beginning to ache.

It was fairly warm inside the trailer, with the little oil heater doing its bit. The first night they made the mistake of shutting off the heater and slightly opening a window for ventilation. Before morning the temperature inside and out had almost equalized to somewhere below zero. About daylight the temperature moderated sufficiently for snow to start falling and it continued until almost noon.

SPARKS had intended starting to run conduit on the roof that morning, but the snow bluffed him and he decided to make up and assemble sockets and reflectors.

Spann helped a little and talked a lot. The electrician had apparently done everything any one else had ever attempted, except commit suicide, and Sparks was almost beginning to wish Spann had done that. Just before noon Sparks interrupted the monologue and asked about nipples to use in connecting the reflector sockets to the condulets on the posts.

"They didn't send any," Spann told him. "You know they are supposed to be bent at a 45-deg. angle, don't you?"

"What!" Sparks exclaimed.

"Yep, that's right, that's what the plan calls for, five-inch nipples bent at a 45-deg. angle."

"Dang-dang!" Sparks said to keep from saying something worse. "How in the heck am I ever going to make a bend that short!"

"There's an air operated press down in the other end of the house," Spann pointed to indicate the direction. "Do you suppose you could use that?"

"Might if I had some kind of jig to bend them, but good gosh!—it'll take a week to make all that bunch of nipples, to say nothing of bending them."

"I'll cut and thread the nipples if you'll figure out some way to bend them," Spann offered.

"O. K.," Sparks replied quickly. "It will be a big help if you will. I'll get to work trying to figure out a jig for bending them."

THE next day was clear but still cold enough to make an Eskimo shiver until about ten o'clock it began to warm up a bit. Sparks decided to take advantage of the weather and start running conduit on the roof. He went to the foreman and again asked for a helper. The foreman hesitated a moment, then said, "O. K., I'll get you a helper," and started down towards the cinder pit. In a few minutes he returned accompanied by a young Mexican boy. "Here's your helper," the foreman said, and went back into the office.

"What's your name?" Sparks asked.

"My name she iss Manuel Valverde. Everybody call me Sammy."

"O. K., Sammy," Sparks said, "go down to the old water service shack and bring some half-inch conduit."

"Can do it?" Sammy repeated, evidently puzzled, then he smiled. "Maybe you joke, no?"

"No, I don't joke. Aw, hell, come on, I'll show you!"

"Me no savvy English much," Sammy said as they walked towards the house to get the conduit. "You speak Spanish?"

"I know two words—si, si," Sparks said. "Now this is conduit," Sparks told Sammy when they had reached the shack.

"Oh—pipe! Me savvy pipe, no savvy conduit."

"O. K.," Sparks agreed, "call it pipe, if you like, but carry about ten bundles of it and lay it by the ladder at the west end of the roundhouse." After repeating and pointing, Sparks finally made his helper understand. The electrician then went to the roundhouse to work on the jig for bending the nipples at a 45-deg. angle.

Sparks took a piece of one-inch extra heavy pipe about four inches long and split it lengthwise. He then took the two half-round pieces to the blacksmith and explained how he wanted them bent.

The blacksmith did a fairly good job. Sparks watched and decided they were O. K. The electrician then had the bent pieces each welded on a flat piece of iron and reinforced so they couldn't spring or give way under pressure. He then tried the improvised bending jig on one of the nipples Spann had made, using the air

(*Continued on page 427*)

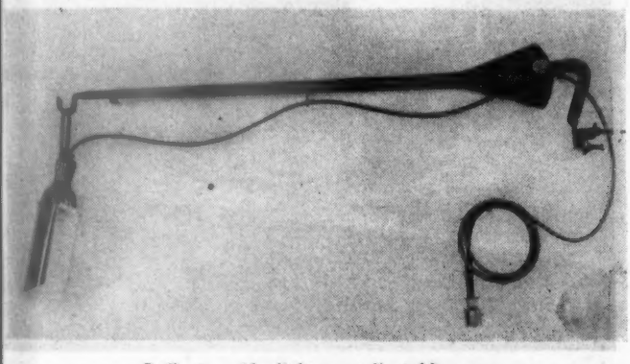
Portable Equipment for

Lighting Enginehouses

To meet the normally difficult requirements of lighting locomotives in enginehouses which has been further complicated by a shortage of materials and blackout conditions, the London & North Eastern of Great Britain has devised sets of lighting equipment which may be moved to the locomotives on which work is to be performed. Six of the sets are being tried out at various enginehouses with a view to more extensive use throughout the system if they are found satisfactory.

To provide convenient handling and to economize flexible cable, the lighting equipment for each engine is divided into two sections and mounted on trucks, one for each side, with each truck equipped as follows:

One portable eight-way-and-main plug and socket distribution box arranged to be hung on the locomotive hand rail to which the portable lights are plugged; three 60- or 100-watt general lighting units, suspended at the ends of adjustable outrigger rods hooked on to the locomotive handrail; two 40-watt gripper hand-lamps for local use, and two 25-watt tubular inspection lamps for examining interiors. One of each pair of lighting trucks also carries one 100-watt pedestal general light for use in the pit, to floodlight the locomotive from below.



Reflector side light on adjustable arm

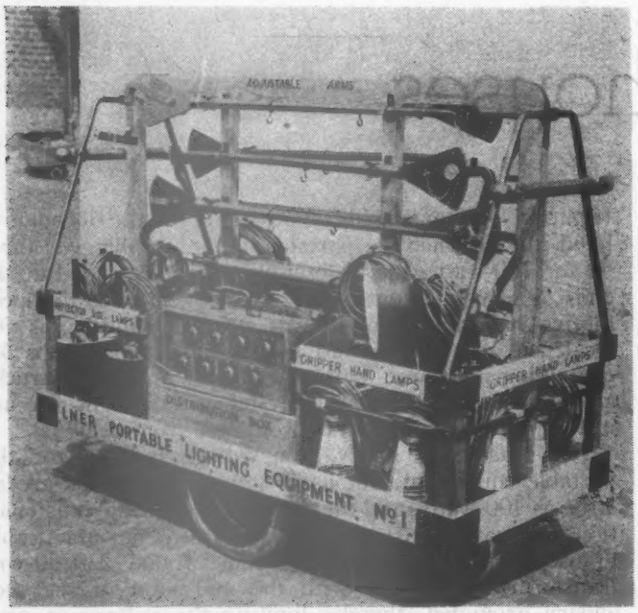
For reasons of safety, low voltage is used for the portable equipment, but as certain of the lamps are as large as 100 watts, and the total loading on each distribution box may be just over 500 watts, it is not practicable to use less than 50 volts. Double-wound 230/50-volt transformers are used with the mid-point of the secondary grounded, thereby limiting the voltage of possible shock to 25 volts.

For one complete locomotive equipment, the capacity of the transformer is 1.25 kva., but larger transformers, are used where work is done on adjacent pits.

Regulations require that metal parts of portable equipment shall be grounded with the exception of the metal guards of portable hand-lamps if the latter be of what is known as the home office type. As the bodies of the plugs and sockets on the distribution boxes are metal, the main flexible cables connecting them to the fixed 50-volt supply sockets must have three conductors and the main plugs and sockets of the 3-pole type, the third conductor being the ground.

All the portable lighting fittings, however, will take

A locomotive lighted entirely by portable equipment showing three adjustable reflector side lamps and an eight-way distribution box mounted on the handrail



Lighting truck loaded with adjustable arm reflector lights, a distribution box and hand portables fitted with spring grippers for attachment at convenient places

the form of "home office" type hand-lamps so that grounding of their metal parts is not necessary, and the flexible cables between the distribution boxes and the portable lighting fittings are therefore two-pole.

The 220-volt fixed outlets are 15-amp. three-pole type receptacles mounted over the aisle between locomotives at a sufficient height to clear a man leaning out of the cab of a moving locomotive and located two in each aisle so that the main flexible connection to each distribution box does not have to cross over the locomotive. There are thus two receptacles for each locomotive under repair.

Points on Armature Handling

Traction motor armatures are handled easily and with little risk of damage by one man at the New York Central shops at Harmon, N. Y. Three simple devices and a monorail hoist fulfill all the requirements.

When a motor is removed from a locomotive or an m. u. car, it is placed commutator end down on the floor after the pinion nut has been removed and the pinion taken off with a puller. A cap nut having the same threads as the pinion nut and with a ring or clevis welded to its closed end is screwed on to the end of the shaft. A large ring and a short length of chain attached to the ring connects it with the hook of the hoist. After the brushes have been removed the hoist is used to lift the armature vertically from between the pole pieces. It is then brought to the position shown in Fig. 1, directly over the block shown in Fig. 2.

The block, which is made of maple, in the form shown, has a height equal to the distance between the outside diameter of the armature and the armature shaft. The hinged cup is made from a piece of steel tubing and is copper lined. It has a diameter slightly greater than that of the armature shaft. The cup is hinged to the block at the bottom and one edge with a ⅞-in. in diameter rod inset into the block and held by a plate at each end. It is important that the cup be hinged at the edge or it will be broken off in use.

The armature is lowered until the commutator end of the shaft is fitted into the cup, after which the lowering is continued, as shown in Fig. 3. Further lowering

Fig. 1—Traction motor armature suspended from the hoist ready for lowering into the cup of the armature block

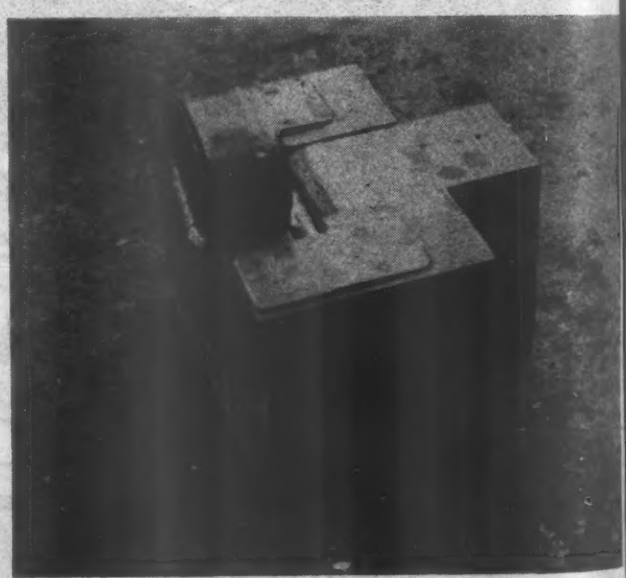


Fig. 2—Armature block with shaft cup in horizontal position, showing how the cup is hinged to the block at one edge

causes the hoist to move on its rail until the armature lies horizontally on the sling below it. The sling consists of a heavy leather strap terminated at each end by a metal ring. When the weight of the armature rests on the sling the cap nut is removed and the hoist and sling are

sed to handle the armature in the horizontal position in which most of the shop work is done.

The procedure is particularly desirable for the armature shown since the edge of the Vee ring adjacent to the

Fig. 3—After the armature shaft is placed in the cup, further lowering of the hoist lays the armature on the sling

commutator is taped and painted with red insulating varnish to increase the leakage distance from the edge of the commutator to ground. This is done to reduce the possibility of a flashover; and if the armature is rested on this tape it will break it down.

Cool Work

(*Continued from page 424*)

operated press. The outfit worked O. K. except the nipples had a tendency to spring back slightly and were not bent enough. "I'll correct that tomorrow," Sparks told Spann, "and now while the weather is better, guess I had better run some conduit on the roof. Is there a vise on a stand that I could take up on top of the roof?"

"No, there are only two pipe vises in the roundhouse," Alex replied. "One at the pipe fitters bench and one fastened on a post about the middle of the roundhouse."

"Well, if I can find a heavy wooden horse, I'll take the one off on the post and fix me up a portable vise. I'll have to have one on the roof."

It took until almost noon to get the makeshift portable vise fixed up and haul the conduit on top of the roof. Then about two hours were spent carrying condulets, straps, nails and miscellaneous material from the shack to the top of the roof. Sammy was a willing worker doing that and got along fine.

Spann had in the meantime been making nipples, but tired of that, perhaps curious, he climbed up on the roof. "Are you going to lay the conduit flat on the roof?" Spann inquired.

"No, guess had better find a B&B man and have some blocks cut. I guess two by fours about eight inches long will be O. K."

"I'll tell him," Spann offered. "How many?"

"Oh, I imagine it will take about twelve to the row," Sparks replied. "Soon as he gets a few sawed, I'll send Sammy to get them."

Sparks had three hack-saw blades in his toolbox and there was one in the storeroom. Sammy broke all of them trying to cut one piece of conduit. That ended conduit work for the day and Sparks went back to his jig making. The second one did a pretty fair job of bending. The angle wasn't exactly forty-five degrees, but near enough that no one would notice. The foreman wired the storekeeper at Plainville to send two dozen hack-saw blades at once. When they came next day, Sparks managed to impress on Sammy that conduit must be cut by sawing and not by leaning heavily on the saw, but the helper still managed to break two or three every day while they were running conduit.

By working outside every hour that was suitable, Sparks finally got the conduit all run in a few days over three weeks. He was then ready to start pulling wire into the conduit.

The wire was all one color—black. "I don't see why they couldn't have sent a few rolls of white for the neutral," Sparks said to Spann. "It's going to be a heck of a job testing out and connecting with Sammy."

"Say, I don't know just how it would work, but I've got about a gallon of red insulating lacquer and some thinner. You might try painting the neutral wire with that."

"O. K.," Sparks agreed, "why don't you try it on a roll. It might work O. K."

One thing in favor of the lacquer was it dried quickly and while it did not cover the black very well, it did change the color enough to be distinguished.

Sammy's idea of pulling wire was something like a frog walking, steady by jerks, and almost every time the wire stuck a little he would jerk the pull wire off, then the wires would have to be pulled out and the conduit fished again which neither expedited the work nor helped Sparks' feelings. Several times the electrician walked outside to cool off and keep from losing his temper.

At last the end of the job was in sight. All that remained was soldering and taping joints. Mrs. Sparks had everything all packed ready to leave Hillside and, as she said, never come back again.

The electrical engineer came to Hillside the day Sparks was finishing the job. "Looks like a pretty fair job for what you had to do with," the electrical engineer said, "but what in the dickens was the idea of bending the lights down like a tired mule's ears?"

"That's the way the print showed them," Sparks explained.

"Well, let's look at them after dark," the engineer said. "I'll meet you here at say eight-thirty."

"O. K.," Sparks replied without enthusiasm.

The electrical engineer turned on all the lights when he reached the roundhouse that night and stood and looked at them. Sparks watched and said nothing.

Finally the electrical engineer broke the silence. "They won't do like that! Besides looking like hell, the light is all on the floor and not a bit on the side of the locomotives. Better start taking the crooked nipples out and replacing them with straight ones tomorrow."

Once more Sparks walked outside to cool off, and when he reached the trailer house and told his wife, she didn't go outside—she exploded right there!

NEW DEVICES

Hose Clamps

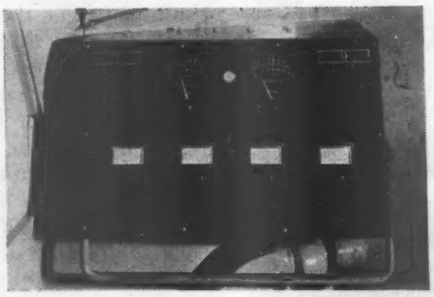
A new one-piece hose clamp using no gears, thumb screws or intricate locking means has been announced by Tinnerman Products Inc., 2039 Fulton road, Cleveland 13, Ohio. The clamp may be snapped over the hose into prelatched position by hand. The final lock is made with hand pressure on ordinary pliers. Made for low-pressure connections, this new clamp has a low profile, is light in weight and exerts an even pressure around the entire circumference of the hose. It is made of SAE-1060

An easily-applied one-piece hose clamp

spring steel with parkerize and zinc-chromate primer finish and is available for all sizes of AN and Ordnance specification hose in a wide range from ½-in. outside diameter.

Shutter Control for Diesel Locomotives

A pneumatically operated temperature-control system designed to control Diesel-electric engine cooling-water systems accurately by modulated shutter operation is now being offered by Minneapolis-Honeywell Regulator Company, Minneapolis, Minn. This control system has been applied to several types of road Diesel-electric locomotives under actual road operating conditions for the past eight months.



Visual cab indicator shows engine temperatures

The system consists essentially of a thermostat the temperature-sensitive element of which is inserted in the water stream in a convenient location. Pneumatically operated motors position the shutters at the demand of the thermostat and the system is designed so that a single thermostat can operate several shutter motors, either in unison or in sequence. In general the basic system of shutter control consists of a thermostat for each engine and a sufficient number of motor operators to control the intake shutter, or shutters, for that engine. In event the oil system is independently controlled, a second thermostat is used for each engine. A manual-automatic switch is provided as a means for manual operation.

A basic control system for one type of locomotive is illustrated and it will be seen that it is possible to add to the basic system, for example, for the control of roof shutters, with no change made in the system. In event roof shutters are used, it is usually desirable to operate the roof and side shutters in sequence, opening the roof shutters first, then the side shutters.

On some railroads it is found desirable to have visual indication in the cab, of approximate engine water temperature conditions, in which case a cab panel is used. When the cab panel is installed the manual-automatic switches are mounted thereon, as well as temperature indicating lights for the engines. With the cab panel it is necessary to use a second thermostat for the purpose of turning on the lights as the engine temperatures vary. This provides no light in the panel for engine temperatures below 145 deg. F., a green light between 145 deg. F. and 180 deg. F. and a red light for engine temperatures above 180 deg. F. It is possible to add a cab panel to the basic system making no changes in the system itself.

This control system is air operated and air to operate the system is taken from the main reservoir tank and reduced through two stages of reduction to 18 lb., which is the operating pressure of the system. This system is so arranged that in event of failure of air supply to the control system, the shutters will all go to the "fail safe" or fully open position. They are then in a position to be operated by hand. By means of a manual-automatic switch, shutters may be either opened or closed by hand, or control may be taken away from the thermostats entirely and they may be operated by hand, without changing any part of the linkage.

Actual road tests with recording thermometers reveal that with this control system engine water temperatures are held to within 4 to 6 deg. of the thermostat setting regardless of changing load conditions. The control point of the thermostat can be set to maintain temperatures anywhere between 145 deg. F. and 175 deg. F. However, the thermostat will stand a maximum temperature of 225 deg. F. without damage. The shutter operator motors are so arranged that in event of a stuck shutter no damage will result to the motor when stalled. Under actual winter operating conditions there is enough movement in the intake shutters so that ice formations will not become troublesome.

Welding Pistol

A process developed primarily to solve the problem of reclaiming defective aluminum castings is being applied to salvaging bronze, grey-iron, malleable and steel castings. It was developed by the Metallizing Company of America, 1330 W. Congress street, Chicago. Other important uses are the building up of surfaces for press fits, the repair of cracked housings, motor

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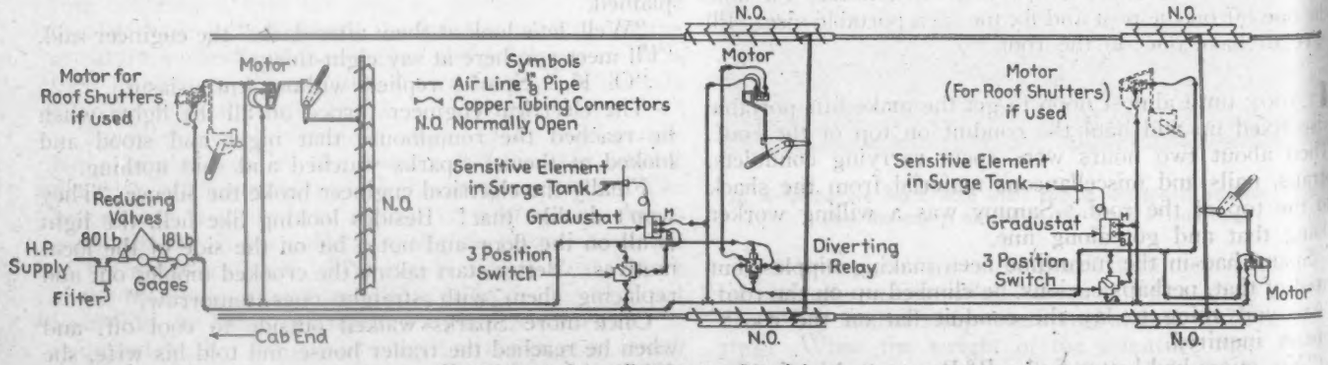
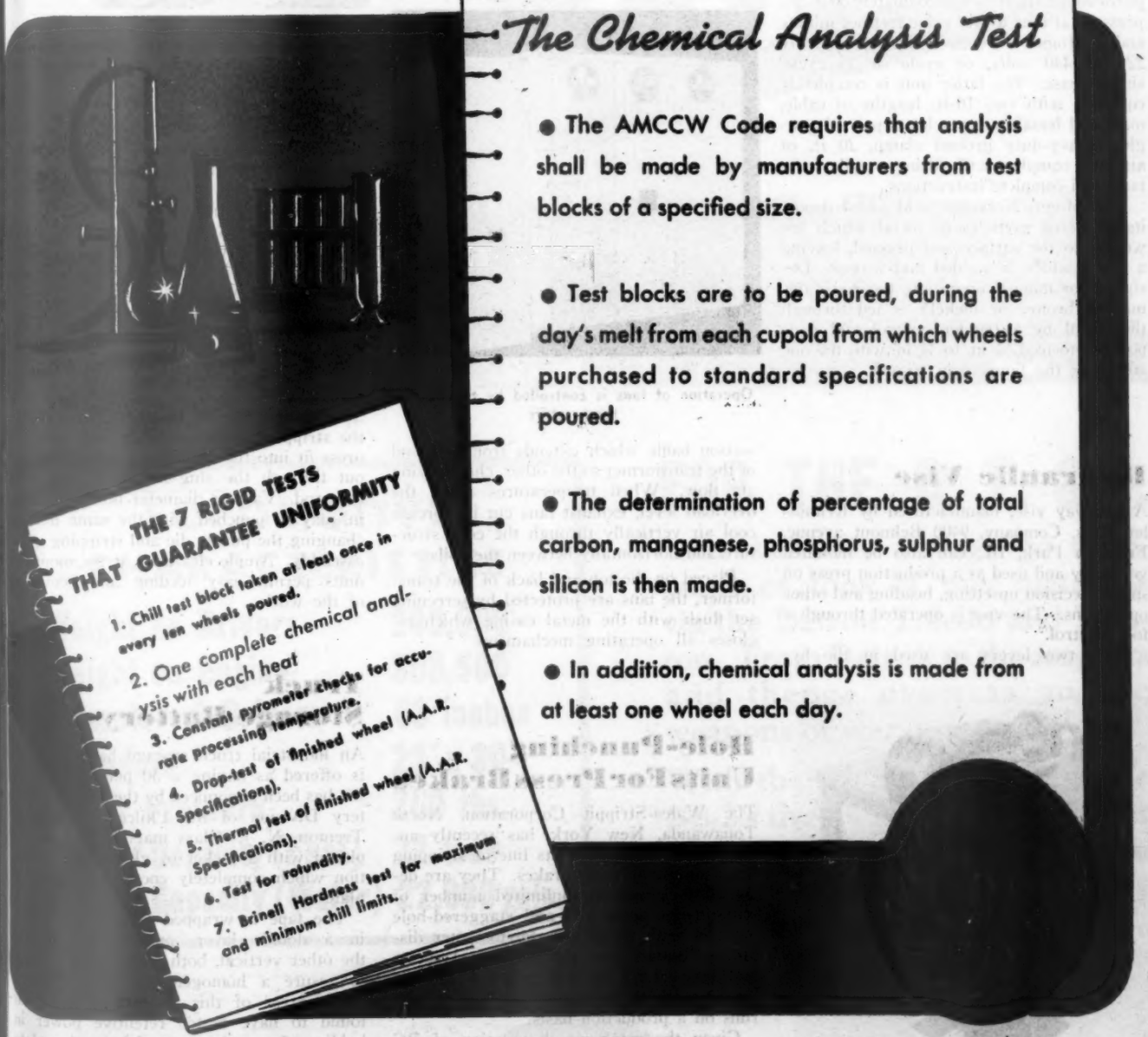


Shutter control installation on a Diesel locomotive

Test No. 2 ONE COMPLETE CHEMICAL ANALYSIS WITH EACH HEAT

The purpose of this test for Chilled Car wheels is to guarantee conformity to standard requirements of chemical composition.



The Chemical Analysis Test

- The AMCCW Code requires that analysis shall be made by manufacturers from test blocks of a specified size.
- Test blocks are to be poured, during the day's melt from each cupola from which wheels purchased to standard specifications are poured.
- The determination of percentage of total carbon, manganese, phosphorus, sulphur and silicon is then made.
- In addition, chemical analysis is made from at least one wheel each day.

ASSOCIATION OF MANUFACTURERS OF CHILLED CAR WHEELS
230 PARK AVENUE, NEW YORK, N. Y. • 445 NORTH SACRAMENTO BOULEVARD, CHICAGO, ILL.
Organized to achieve: Uniform specifications — Uniform inspection — Uniform product

Aluminum, bronze or nickel wire can be used in this welding pistol

blocks, and pump housings, as well as the preparation of surfaces for metallizing.

A complete installation to do this type of repair includes a Mogul Nervous-Weld pistol which requires approximately 60 lb. air pressure at four to five cubic feet per minute and a Mogul Nervous-Weld machine, 110 220 or 440 volts, 60 cycle or 25 cycle, single-phase. The latter unit is completely equipped with two 10-ft. lengths of cable, male and female receptacles, a pair of goggles, heavy-duty ground clamp, 20 ft. of air hose complete with fittings, wall receptacle and complete instructions.

The Mogul Nervous-Weld pistol deposits atomized particles of metal which are welded to the surface and pressed, leaving a metal which is welded and forged. Designed for manual operation, the rod (aluminum, bronze or nickel) is fed through the pistol by a trigger control and it is possible to feed ⅛ in. to ⅜ in. with the one stroke of the finger-grip trigger.

Hydraulic Vise

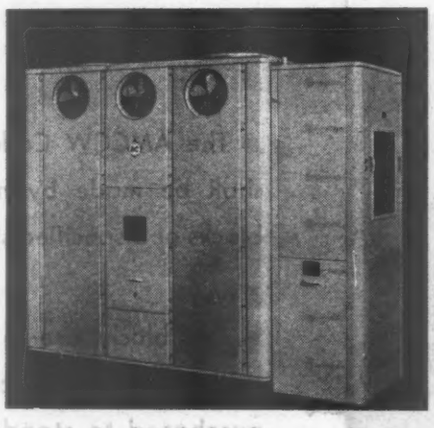
A vee-way vise, manufactured by Reimuller Bros. Company, 9400 Belmont avenue, Franklin Park, Ill., can also be mounted vertically and used as a production press on small precision upsetting, heading and other operations. The vise is operated through a foot control.

Only two levers are used in the hydraulic control, one to apply pressure up to rated tonnage; the other for release. No outside air lines or power is needed and the unit is self air-eliminating. The vise is portable, in that it has a flexible hydraulic base, which makes possible adapting the unit to various machines. Two sizes are available; four tons with 4-in. opening, and seven tons with 7-in. opening.

Hydraulic vise unit which can be mounted vertically and used as a small press

Air-Type Transformers With Automatic Cooling

The Allis-Chalmers Manufacturing Co., Milwaukee, Wis., has introduced a dry-type transformer which embodies an induced cooling system which operates automatically to provide extra cooling when transformers are overloaded. The design includes a Z-section baffle which extends from one end of the transformer to the other, channelizing air flow. When temperatures reach the overload level, exhaust fans cut in, forcing cool air vertically through the core structure and horizontally between the coils.



Operation of fans is controlled by transformer temperature

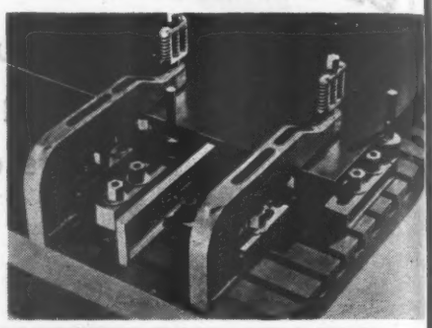
Placed on the top and back of the transformer, the fans are protected by screening set flush with the metal casing which incloses all operating mechanisms.

Hole-Punching Units For Press Brakes

The Wales-Strippit Corporation, North Tonawanda, New York, has recently announced an addition to its line of stripping units for use on press brakes. They are designed to punch an unlimited number of straight-line scattered- and staggered-hole patterns with varying center-to-center distances. Square sheared and curved sheets and long strips of flat material may be perforated with these units in short or long runs on a production basis.

Given the catalogue designation of BC units, they may be used interchangeably in press brakes and stamping presses by mounting on T-slotted plates, templates and rails. After a pattern has been run, the same group of units may be used in another hole-punching pattern, eliminating dead storage of the units.

By using two Wales T-slotted plates and two groups of type BC units, it is possible to have one pattern operating in a press while another pattern is being set up on the second T-slotted plate away from the press. At the completion of the first run, the second set-up is moved onto the press bed, ready to start operating. While the second set-up is operating, a third pattern may be set up with the first group of units and first T-slotted plate, and so on.



Units mounted to show the relation between them, the T-slotted plate, stops, feed rail and work

These Type BC Units are made up of punches, dies and stripping-guide assemblies which are held together by holders as independent, self-contained units. The holders also hold the punch and die in perfect alignment.

Nothing is attached to the press ram. The ram only operates to depress the punch through the material. The punch is full-floating and may be instantly lifted out of the stripping-guide assembly. The die is a press fit into the holder and may be tapped out through the slug-clearance hole by a bent rod. Various diameter holes up to 5/16 in. may be punched with the same unit by changing the punch, die and stripping guide assembly. Ample clearance at the mouth of units permit easy feeding and removing of the work.

Truck Storage Battery

An industrial truck storage battery which is offered as having a 30 per cent longer life has been announced by the Storage Battery Division of the Philco Corporation, Trenton, N. J. Glass mats have been replaced with a jacket of glass tape insulation which completely encases the positive plates.

The tape is wrapped around the plates in a double layer, one horizontal and the other vertical, both with ample overlap to assure a homogeneous film. Even a single layer of this glass tape has been found to have better retentive power in holding the active material in the plate than the standard glass mat and by completely encasing the grid frames, the rate of peroxidation of the grids is materially decreased. At present the battery is available in certain sizes and limited quantities.

(*Turn to next left-hand page*)

4 more 2-8-2's

LOCOMOTIVE CHARACTERISTICS

Weight on Drivers	248,500
Weight on Engine	369,500
Diameter of Drivers	63 inches
Cylinders	23" x 30"
Boiler Pressure	260 lbs.
Fender Capacity (Fuel)	22 tons
Fender Capacity (Water)	22,000 gals.

FOR THE D. T. & I.

Into war-busy Detroit go thousands of tons of raw materials via the Detroit Toledo and Ironton. From Detroit to the seaports and thence overseas go the weapons of war.

With the addition of four more 2-8-2's the D. T. and I. has a fleet of 22 Lima-built locomotives in the job of keeping this heavy traffic flowing steadily.

LIMA LOCOMOTIVE WORKS INCORPORATED, LIMA, OHIO

Metal Filter For Feedwater

Pads of Monel wire-mesh cloth are now being used to filter oil, grit, and scale from locomotive feedwater. Placed over the feedwater outlet of the tender, the new

A Monel wire-mesh filter for boiler feedwater

pads give free flow through 100 sq. ft. of filtering surface, although they are only 14 in. by 20 in. in size. They replace such filtering mediums as sponges, coke, and turkish toweling.

The pads are formed of folded mesh knit from .006 Monel wire by the Metal Textile Corporation, Orange, N. J. They are readily cleaned by steam or any oil solvent and they may be re-used many times.

Rerailer Requires No Spiking

The Pettibone Mulliken Corporation, Chicago, has developed a new rerailer with a bridge which fits over the rail and with cleats on the bottom spaced to bear against the side of ties and prevent sliding. The

A No. 6 inside rerailer

principal feature of the rerailer is that it may be placed by one man, without spiking or clamping and, once set, it is said that it will not tip, upset or slide. This eliminates the need for digging and tedious spiking in cramped quarters, thereby saving time in rerailing work.

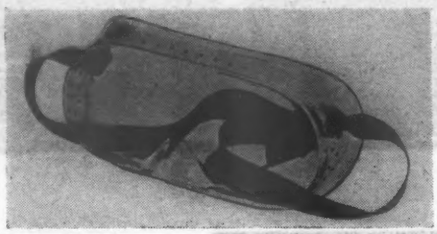
The rerailer is made of manganese steel with flares wider than usual and with gradual slopes. It has two hanger holes on the side, one round and one oval, for variable spaced hangers. It has a handle underneath and a large hand hole on the side to facilitate handling and placing in position. The stop on the inside rerailer is said to be low enough for clearance, but high enough to tend to prevent overriding of wheels and its design eliminates dangerous side slip.

Because it is made of manganese steel the rerailer resists the shock stresses and heavy impacts common to its use without deforming or breaking and if it deforms under unusual conditions, it can be sledged back into shape and used again.

The rerailer is made in two types, inside and outside, and in two sizes; No. 6 for use on all rail sections up to and including 90 lb.; and No. 7, for use on all rail from 90 lb. up to and including 131 lb. The No. 6 inside and outside rerailers weigh 105 and 115 lb., respectively, and the No. 7 inside and outside rerailers weigh 150 and 155 lb., respectively.

Full-View Goggle

An all-purpose goggle manufactured by the U. S. Safety Service Co., Kansas City, Mo., allows clear vision both to the front and sides and can be worn over glasses. The goggle is made in both lucite and ace-



A single lens in this goggle permits clear front and side vision

tate, lucite for superior vision and acetate for unusual strength. The goggle is treated with an anti-scratching compound and is so constructed that the lens does not touch the surface when placed on a table. Although the goggle is nearly 1/16 in. thick it weighs only 1¼ ounces.

Buna S Electrical Insulation

Nubun, a new synthetic rubber latex insulation for power, lighting and communication cable has been developed by the United States Rubber Company, New York. It is made from a special modification of the Buna S synthetic rubber used for tire manufacture. The qualities of Nubun include flexibility, impermeability to water, laminated construction, and, since it is made by the latex continuous dip method, perfect centering of the conductor to produce an insulated wire of maximum conductivity and minimum diameter.

The insulation has a voltage breakdown after submersion in water at room temperature of 650 volts per mil of thickness an tensile strength of 2,500 lb. per sq. before aging, and 2,000 lb. per sq. in. af aging 96 hours in an oxygen bomb. It resist severe wear because, by the nat of the latex process, the rubber partic are not distorted or broken down by milli

The standard GR-S rubber found m advantageous for the greater part of Government's program and for most m tary applications is based on a 75 per c butadiene—25 per cent styrene composit The modified polymer used for Nubun a special styrene ratio and is prepared b modified reaction technique which gives improved processing and insulating pr erties.

Outdoor A. C. Welders

Two outdoor a.c. welders, a 500-amp. t and a 300-amp. type have been announc by the Electric Welding Division of General Electric Company, Schenectad N. Y. The larger welder has a curr

The welders are designed for use where exposed to the weather

range from 100 to 625 amp. while that o the other is from 60 to 375 amp.

The welders have "idlematic" control which functions to reduce the output voltage automatically to less than 30 volts whenever the arc is not in operation, yet provides full power for welding directly the arc is struck. In addition, this control is equipped with a switch, conveniently operated by a handle projecting through the top of the case, for shutting off the welder when not in use.

Protection against the entrance of rain, snow, and sleet is insured by the drip-proof construction of all openings in the top of the enclosures of the welders, and by a sealed window over the current indicator. The ventilating openings serve both to shed water and to keep air velocity low. A special finish on all internal parts protects against corrosion from moist air.

These welders also incorporate built-in power-factor improvement, fingertip adjustment, stepless current control, and fan-forced ventilation.

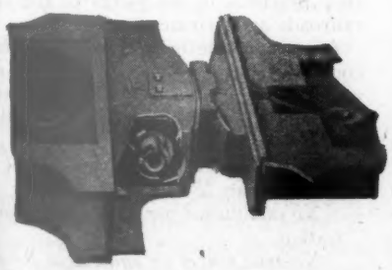
(*Turn to next left-hand page*)

RALPH P. JOHNSON

Chief Engineer, The Baldwin Locomotive Works

in his book on THE STEAM LOCOMOTIVE *states:*

"WITH certain types of radial buffers, properly maintained, between engine and tender, the tender properly becomes part of the locomotive mass. While no account is taken of this in counter-balance calculations, it provides a factor of safety for the absorption of the inertia effects of the reciprocating parts."



THE Franklin E-2 Buffer meets this requirement, and also provides free flexibility between engine and tender to compensate for curves and turnouts.

FRANKLIN RAILWAY SUPPLY COMPANY, INC.

NEW YORK • CHICAGO

In Canada: FRANKLIN RAILWAY SUPPLY COMPANY, LIMITED, MONTREAL

NEWS

Fall Mechanical Association Meetings Cancelled

THE annual meetings of co-ordinated mechanical associations, including the Railway Fuel and Traveling Engineers' Association, Master Boiler Makers' Association, Car Department Officers' Association, and Locomotive Maintenance Officers' Association, scheduled to be held at the Hotel Sherman, Chicago, September 26 to 29, 1944, have been cancelled at the request of A. A. R. Mechanical Division. The request was made in a formal letter from Executive Vice-Chairman V. R. Hawthorne which stated that the general committee had reviewed again the matter of holding these meetings, and, in view of present conditions, asked that the annual meetings be cancelled for 1944. He explained that the request was being made in accordance with the expressed desire of Col. J. Monroe Johnson, director of the Office of Defense Transportation.

Radio Telephone for Terminal Traffic Control

THE Baltimore & Ohio on July 27 demonstrated the radio-telephone train communication system with which it has been experimenting for some time. A handset located in the Baltimore, Md., dispatcher's office is connected by wire to sending and receiving equipment located on the B. & O. office building at a height of 260 ft. This is a 50-watt transmitter. One Diesel-electric locomotive and one caboose which operate in the Baltimore area are equipped with 6-watt transmitters and receivers. The mobile units permit good end-to-end communication and intelligible conversation can be carried on between the dispatcher's office and the train at a distance of 8 or 9 miles. The purpose of this system is to expedite the movement of freight cars in the local yards. In addition to the train-operating advantages afforded by end-to-end communication, the demonstration showed how the dispatcher could instruct the train conductor to pick up certain freight cars needed for delivery to loading ships.

The carrier frequency used was 156.526 (corresponding to a wave length of about 6 ft.) with a twelve kilocycle passband. Total power input to the fixed station is about 900 watts and total power input to the mobile units about 200 watts. It is expected that improvements will reduce the latter to 100 watts. A type J antenna is used for the fixed station, and experiments are being conducted to determine the directional effect of different types. The antennae on the mobile units consist of a vertical member with an eight-spoke counter-poise. No interference is caused by paralleling power lines, overpasses, or steel bridges, and passing trains do not interrupt conversation. No difficulty is anticipated by long tunnels, though this may require repeater sets or tunnel conductors, or both. The respective advantages of frequency and amplitude modulation are being tried. The experiments are being conducted by the B. & O. in cooperation with the radio division of the Bendix Corporation.

American Welding Society to Hold Twenty-Fifth Annual Meeting

Seventeen technical sessions embracing more than sixty papers on welding subjects will feature the 25th Annual Meeting of the American Welding Society to be held in the Hotel Cleveland, Cleveland, Ohio, from October 16 to 19. The meeting is being held, as in past years, in conjuncton with the National Metals Congress.

Three talks emphasizing the importance of welding in meeting the wartime production needs of the nation will be delivered at the opening session on the morning of October 16. Admiral H. L. Vickery, U. S. Maritime Commission, will speak concerning the use of welding in shipbuilding; Colonel S. B. Ritchie, U. S. Army, of its use in the fabrication of ordnance equipment; and W. B. Stout, Consolidated Vultee Aircraft Corporation, of welding in aircraft production. The work of the American Welding Society in promoting the production of needed ordnance equipment will be recognized by the presentation of the Ordnance Distinguished Service Award at this session. According to the Chief of Ordnance, United States War Department, the award is being made as a recognition of the "outstanding contributions" of the Society and because of its scientific and engineering achievements during the war years.

The technical papers to be presented cover the entire range of application of welding and allied processes, emphasizing wartime applications. Most of these applications and developments will be of importance when industry returns to normal peacetime production. The men who have prepared the papers represent the thinking of those interested in production, supply, engineering and research.

Miscellaneous Publications

"Bolts, Nuts & Screws." Second edition. The Lamson & Sessions Company, 1975 West Eighty-Fifth street, Cleveland, Ohio. Case-bound, 180-page book; 9 in. by 12 in. Price, $1.00. This book was originally compiled in 1941 by A. E. R. Peterka. The second edition is nearly three times as large. It is a collection of practical discussions on engineering, design, and production of headed and threaded products. It brings together valuable bolt and nut manufacturing experience and research not otherwise found in the files of any one manufacturer or in the files of the technical press of any engineering society.

Mechanical Division A. A. R.

IMPROPER CAR REPAIRS

In a letter dated August 10, V. R. Hawthorne, executive vice-chairman of the A. A. R. Mechanical Division states that certain repair points, fully equipped to make proper repairs to freight cars without undue delays, are resorting to wrong repairs of a temporary nature in order to release as many cars as possible within a given period of time.

While such practices may result in a larger shop turnover of cars repaired, Mr. Hawthorne points out that, where the repairs are not of a lasting nature the same car has to be subsequently shopped within a short period of time; thus the net result is a much greater delay than there would have been had the car been held a little longer in the previous shopping and repairs properly performed.

This matter was previously covered in an A. A. R. circular letter of December 22, 1941, and it is urged in the interest of manpower conservation and expeditious handling of freight cars that proper action be taken to consistently carry out the intent of this circular in all cases.

Where cars are sent to contract shop for repairs, the car owner is requested to impress upon the contract shop management the necessity for making complete and permanent repairs as outlined in this circular.

WHEEL SHOP PRACTICES

In a circular letter dated August 10, A. C. Browning, Secretary of the A. A. R. Mechanical Division, states that the Mechanical Inspection Department of the division is now, and for the past several weeks, has been, making investigation of wheel shop practices in the plants of the various railroads and private car lines.

A considerable number of unsatisfactory conditions have been found in some of the wheel shops visited to date, the most predominant irregularities mentioned in the letter being as follows:

Boring Mill Practice. (Wheel and Axle Manual, par. 354.)

No established period for inspection and testing.

No true wheel or equivalent for use in periodic inspection.

Chuck jaws out of alignment.

Calipers used instead of micrometers.

Wheels with bores having taper beyond the permissible maximum.

Bores of second-hand wheels not checked.

Axle Lathe Practice. (Wheel and Axle Manual, par. 355.)

No established period for inspection and testing.

Lathe worn, cutting tool being used out of proper position.

Calipers used instead of micrometers.

Wheel seat taper beyond the permissible maximum.

Journal taper beyond the permissible maximum.

Second-hand axles not checked in lathe.

Axles with heat affected journals not Magnafluxed.

Nicks, burrs, and scratches on journals and about axle centers.

Wheel Press Practice. (Wheel and Axle Manual, par. 356.)

No established period for inspection and testing.

Ram shoes worn out of proper plane.

No pressure recording gage, recording gage defective or irregular.

Wheel identification omitted from mounting diagram.

Mounting pressure in excess of or below prescribed limits.

Mounting lubricant not equal to prescribed formula.

Check gage badly worn or non-A. A. R. and not equal to requirements.

Mounted wheels with irregular check gage distance.

No gage available for locating axle center.

Mounted wheels not spaced properly relative to axle center.

Axle centers marked by use of center punch instead of suitable gage.

Common wheel stick used.

The purpose of this circular is to direct attention to unsatisfactory conditions existing and irregularities which have been found to date, with suggestion that each railroad and private car owner make investigation in his own shops and take immediate action to insure compliance with the Standard Rules Governing Wheel Shop Practice, instead of waiting until each individual shop is investigated by the A. A. R. Mechanical Inspection Department.

The letter urges that each wheel shop foreman or supervisor be provided with the current edition of the Wheel and Axle Manual issued in May—1942, and Supplement No. 1 thereto issued in November—1943, as previous issues of this Manual did not carry the Rules Governing Wheel Shop Practices appearing as Sec. XX in the current issue. This letter was issued on behalf of the A. A. R. Committee on Wheels.

Maintenance of Freight Air Brakes

In order to reduce the number of undesired emergency brake applications on freight trains to a minimum, the A. A. R. Mechanical Division states in a circular letter dated August 10, that it is necessary to modify Instruction Pamphlet 5039-3 to require more restrictive tests for the K triple valves and to require the use of a limited number of gages for the AB valves.

Effective September 1, 1944, the following modifications in instruction Pamphlet No. 5039-3 are therefore in effect:

1—Test No. 1—Resistance Test. Change maximum allowable resistance for 3½ in. dia. pistons or under from 6 lb. to 5 lb. for resistance with slide valve in place, and from 5 lb. to 4 lb. for resistance of piston alone in bush.

2—Test No. 6—Packing Ring Leakage Test. Reduce the maximum allowable ring leakage from 5 lb. in one minute to 4 lb. in one minute.

3—Test No. 8—Service Stability Test. Use Position 6 instead of Position 5 of valve A when testing K-1 valves and Position 7 instead of Position 6 when testing K-2 valves.

Effective September 1, 1944, or as soon thereafter as available, the use of the following gages for gaging various parts of the AB valve when taken apart for cleaning and/or repairing will be required:

1—Gage—Westinghouse Air Brake Company Piece No. 524954—New York Air Brake Company Piece No. N-5693, for gaging the inside diameter of small service and emergency piston bushings.

2—Gage—Westinghouse Air Brake Company Piece No. 524953—New York Air Brake Company Piece No. RG-142, for gaging the small diameter of the service and emergency pistons.

3—Gage—Westinghouse Air Brake Company Piece No. 524949—New York Air Brake Company Piece No. N-5694, for gaging the diameter of the emergency piston bush, and selecting proper size rings.

4—Gage—Westinghouse Air Brake Company Piece No. 524950—New York Air Brake Company Piece No. N-5695, for gaging the diameter of the service piston bush and selecting proper size rings.

5—Gage—Westinghouse Air Brake Company Piece No. 524952—New York Air Brake Company Piece No. N-5696, for gaging the diameter of the accelerator release piston bush and selecting proper size rings.

6—Gage—Westinghouse Air Brake Company Piece No. 524951—New York Air Brake Company Piece No. N-5697, for gaging the diameter of the vent valve piston bush and selecting proper size rings.

Nickel-Plate Locomotives—A Correction

In the article descriptive of the 2-8-4 type locomotives built by the American Locomotive Company for the Chesapeake & Ohio on page 349 of the August issue of the *Railway Mechanical Engineer*, mention is made of the use of plain bearings on a total of 55 2-8-4 type locomotives built by the American Locomotive Company for the New York, Chicago & St. Louis. All driving axles and engine trucks of the last 15 2-8-4 type locomotives built by Lima for the Nickel Plate are equipped with Timken roller bearings. Fifteen additional locomotives of the same type now being built by Lima for the same road will be similarly equipped, making a total of 30 roller-bearing equipped locomotives for the Nickel Plate.

Train Telephone for Pennsylvania Main Line

The first application to its main-line operations of train-to-train and train-to-tower telephone communication was announced on August 7 by the Pennsylvania. The road's electronic train-telephone system, providing instantaneous and continuous communication between moving trains and wayside towers and between moving trains themselves, will be installed on two main line four-track divisions, covering 245 miles of line, between Harrisburg and Pittsburgh, Pa.

This new installation of the electronic train telephone, which was developed in collaboration with the Union Switch & Signal Company and has been in experimental use since June, 1942, on the Belvidere-Delaware Branch in northern New Jersey (described in the March issue of *Railway Mechanical Engineer*, page 134, will give officers of the railroad opportunity to work out the adaptation of the new system to conditions in one of the heaviest railroad traffic areas of the country.

The train telephone will be utilized in conjunction with the modern signaling and safety devices—automatic block signals and locomotive cab signals—and the installation, costing over $1,000,000 will, in effect, says the railroad's statement, "be a huge communication laboratory for further advancing the efficiency of railroad operation." Approximately 300 passenger and freight locomotives, 90 freight train cabin cars, and six strategically located wayside towers along the 245 mile stretch of main line track will be equipped with the train telephone.

Towermen in wayside towers can talk over the telephone with train crews moving in their areas, even though many miles distant, for the transmission of instructions, reports and information pertaining to train operations. On freight trains, the conductor in the cabin car and the engineman in the locomotive cab may talk to each other at will, and the crew of one train may communicate with the crew of another several miles distant. On passenger trains the telephone system will now be installed only on locomotives, the air-whistle train signal continuing to care for intratrain communication in passenger service. Passenger enginemen will be in constant reach of the towermen and of other trains, by means of the telephone.

The most recent refinements in the electronic train telephone, the announcement explained, have been brought about through the pooling of the facilities, laboratory research and engineering resources of the Union Switch & Signal Company and the General Electric Company. Both of these industries have been working in the field of train communications for almost a quarter of a century. The train telephone utilizes high-frequency alternating electric currents, transmitted by induction to the rails and to existing wires on poles parallel to the tracks. The transmission paths are, therefore, confined entirely to railroad property.

As a result of the collaboration between the two signal and electrical companies, the train telephone system is now enabled to employ frequency modulation and higher carrier currents for transmission, thereby materially increasing its efficiency and removing any handicap to its use in high static locations, such as electrified trackage or dense industrial areas.

No change is made in the operating rules governing the movements of trains when the train telephone is used. The system permits a constant flow of information between train crews and towermen, keeping the train dispatcher fully advised of train movements

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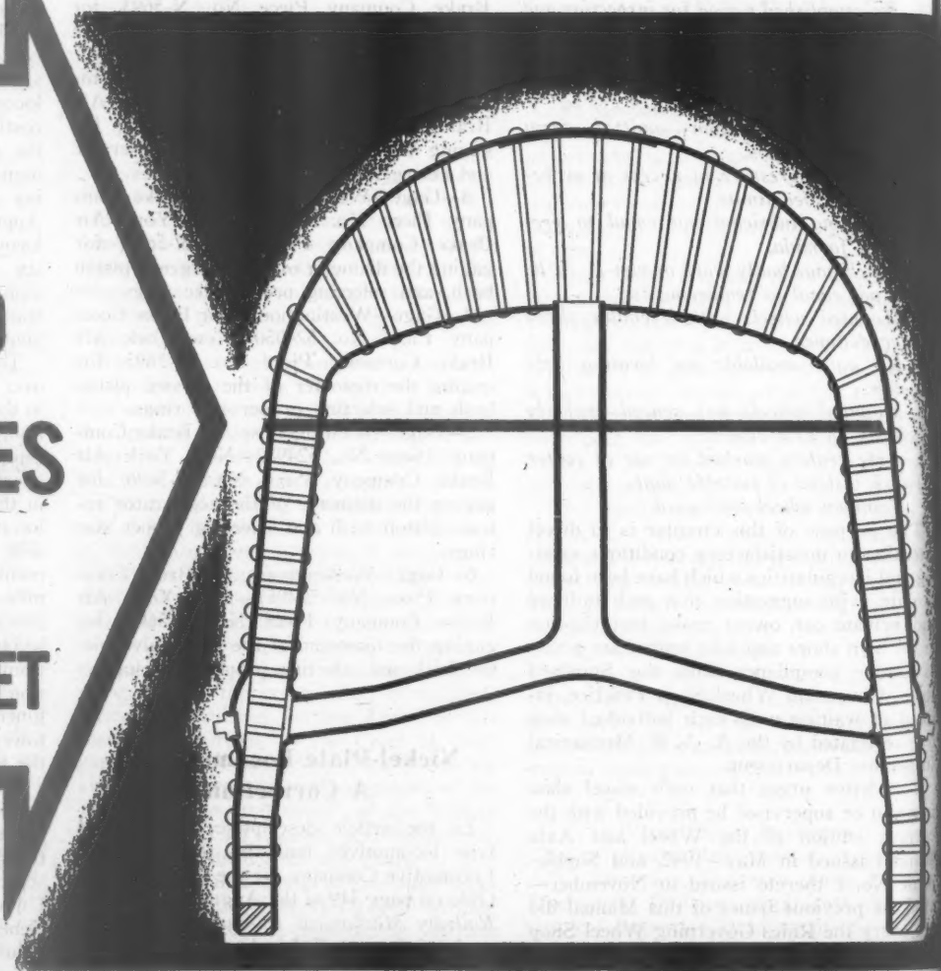
Security

WATER DROPPED 16 7/8 INCHES BELOW CROWN SHEET

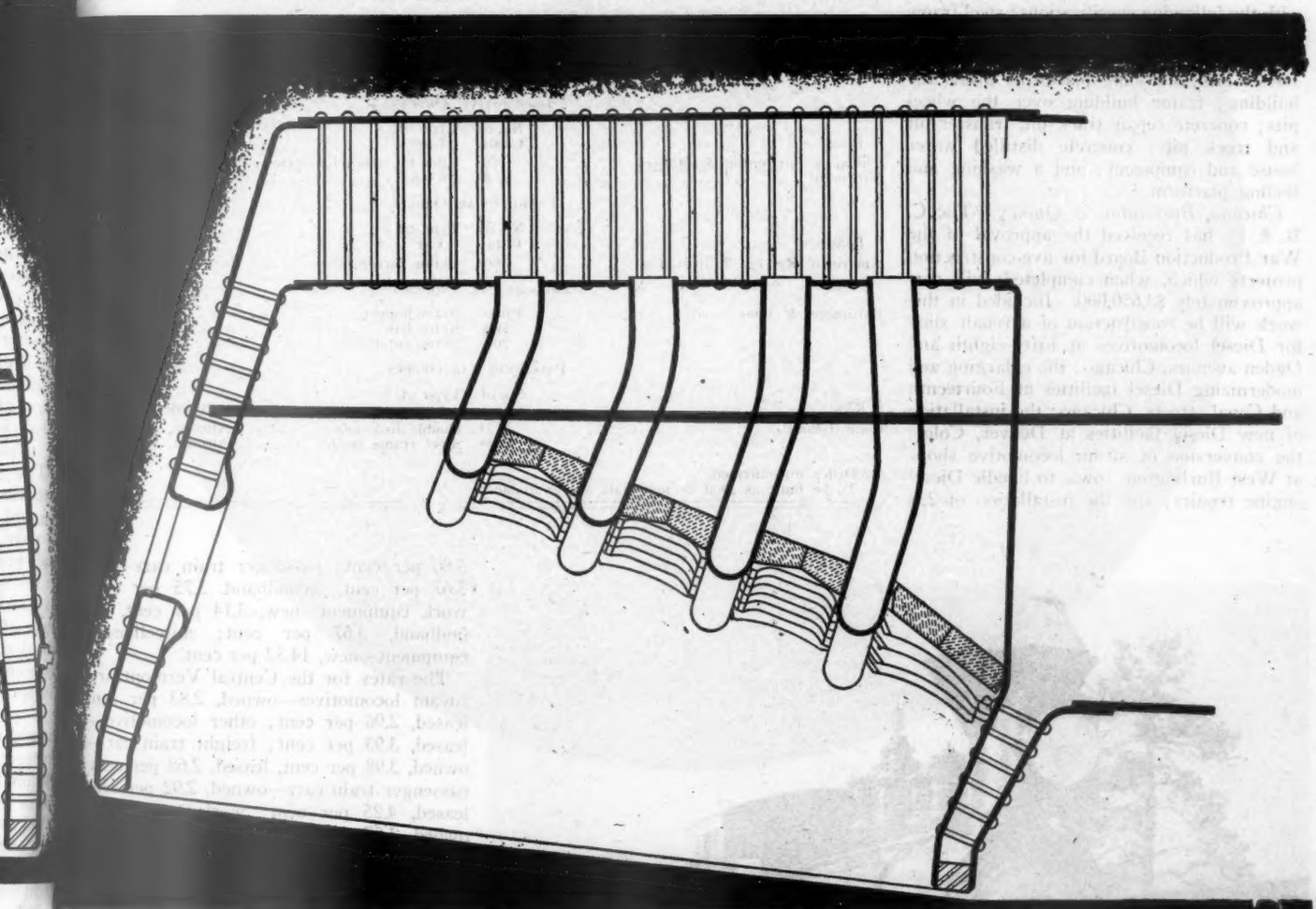


On a midwestern railroad the water level in a Mikado type locomotive, equipped with four Security Circulators, receded sixteen and seven-eighths inches below the crown sheet — yet only a few radial crown bolts pulled.

The Security Circulators produced a positive flow of water over the center of the crown sheet. This protected the crown sheet despite the low water, thus preventing a serious boiler accident.

With Security Circulators suitably spaced from flue sheet to door sheet, an ample and positive flow of water over the entire crown sheet is thus assured in the event of a receding water level.

circulators



AMERICAN ARCH COMPANY, INC.

NEW YORK • CHICAGO

SECURITY CIRCULATOR DIVISION

and thus facilitating the planning of the general operation more efficiently. When operating conditions change for any reason, the train telephone enables all persons concerned to communicate with one another promptly, reducing delays which otherwise would occur if wayside telephones had to be used for reporting the circumstances.

Shop Construction

Atchison, Topeka & Santa Fe.—The Santa Fe has awarded a contract to the Swinerton & Walberg Construction Company, Los Angeles, Calif., for the construction at Barstow, Calif., of a Diesel engine service building to measure 138 ft. by 325 ft., with the following specifications: steel frame on a concrete foundation; glass and corrugated Transite sides and roof; concrete Diesel pits; servicing platforms inside the building; frame building over the wheel pits; concrete repair track pit, transfer pit and truck pits; concrete distilled water house and equipment; and a washing and fueling platform.

Chicago, Burlington & Quincy.—The C. B. & Q. has received the approval of the War Production Board for five construction projects which, when completed, will cost approximately $3,650,000. Included in this work will be construction of a repair shop for Diesel locomotives at Fifty-eighth and Ogden avenues, Chicago; the enlarging and modernizing Diesel facilities at Fourteenth and Canal streets, Chicago; the installation of new Diesel facilities at Denver, Colo.; the conversion of steam locomotive shops at West Burlington, Iowa, to handle Diesel engine repairs; and the installation of 228 miles of Centralized Traffic Control between Lincoln, Neb., and McCook.

Northern Pacific.—The Northern Pacific has awarded a contract amounting to approximately $200,000, to the Austin Company, Seattle, Wash., for the modernizing of its locomotive shop and enginehouse steam plant at Livingston, Mont. Included in the work is the replacement of four 200-hp. boilers by two 700-hp. boilers and the installation of coal handling and storage equipment, a new mechanical ash conveyer, new pumps and a plant for treating boiler feed water. Floor space will be increased and the roof raised to house the enlarged facilities.

Equipment Depreciation Rates

EQUIPMENT depreciation rates for the Denver & Rio Grande Western and the Central Vermont are among those prescribed by the Interstate Commerce Commission in a recently-issued series of sub orders in its general proceeding, Depreciation Rates for Equipment of Steam Railroad Companies.

The rates for the D. & R. G. W.'s standard-gage equipment are as follows: Steam locomotives—new, 3.13 per cent, secondhand, 4.1 per cent; Diesel-electric switchers, 4.85 per cent; Diesel-electric road freight locomotives, 6.4 per cent; freight train cars—new, 3.17 per cent, secondhand 3.86 per cent; passenger train cars—new, 5.67 per cent, secondhand, 3.75 per cent; work equipment—new, 3.14 per cent, secondhand, 3.67 per cent; miscellaneous equipment—new, 14.52 per cent.

The rates for the Central Vermont are: Steam locomotives—owned, 2.83 per cent, leased, 2.96 per cent; other locomotives—leased, 3.93 per cent; freight train cars—owned, 3.98 per cent, leased, 2.68 per cent; passenger train cars—owned, 2.92 per cent, leased, 4.25 per cent; work equipment—owned, 3.57 per cent; miscellaneous equipment—owned, 11.1 per cent.

Orders and Inquiries for New Equipment Placed Since the Closing of the August Issue

LOCOMOTIVE ORDERS

Road	No. of Locos.	Type of Loco.	Builder
Chicago, Burlington & Quincy	50	1,000-hp. Diesel-electric	Baldwin Loco. Wks.
Virginian	8[1]	2-6-6-6	Lima Loco. Wks.

FREIGHT-CAR ORDERS

Road	No. of Cars	Type of Car	Builder
American Refrig. Transit Co.	300	40-ton refrigerator	Co. shops

FREIGHT-CAR INQUIRIES

Baltimore & Ohio	1,000	50-ton hopper
	500	50-ton box
	200	50-ton automobile

PASSENGER-CAR ORDERS

Road	No. of Cars	Type of Car	Builder
Long Island	5[2]	Double-deck motor	Altoona, Pa., shops
	5[2]	Steel frame trailer	Altoona, Pa., shops

[1] Order unconfirmed.
[2] To be built as soon as materials are available.

* * *

An old-time Santa Fe locomotive, No. 137, known as "Baby"—Note the link and pin coupler, the rope on the pilot beam, and the branch pipe extending under the running board to the pump

According to H. W. Stowell, the contributor, this picture was made in 1880 by Ben Wittick, an Albuquerque, N. M., photographer who wore his hair long like Buffalo Bill and who photographed ceremonial dances at several Pueblo and Zuni Indian villages. The print from which this illustration was made was reproduced from the original dry-plate negative now in the possession of the Santa Fe, N. M., Laboratory of Anthropology.

Employment of Women on Railroads Increases

During the three-months' period from mid-January to mid-April this year the number of women employed by Class I roads continued to increase, according to the most recent figures of the Bureau of Transport Economics and Statistics of the Interstate Commerce Commission, and the net increase during this interval was somewhat larger than in the preceding quarter. In the period ended with mid-April the number of women employed was 112,063. The mid-January total was 105,901 and the total for April, 1943, was 82,106.

While the number of women employed was thus increasing in the quarter, the total number of employees increased from 1,357,252 to 1,412,184, so that the women employees made up 7.94 per cent of the total in mid-April, as compared to 7.80 per cent three months before, and 6.09 per cent in April, 1944.

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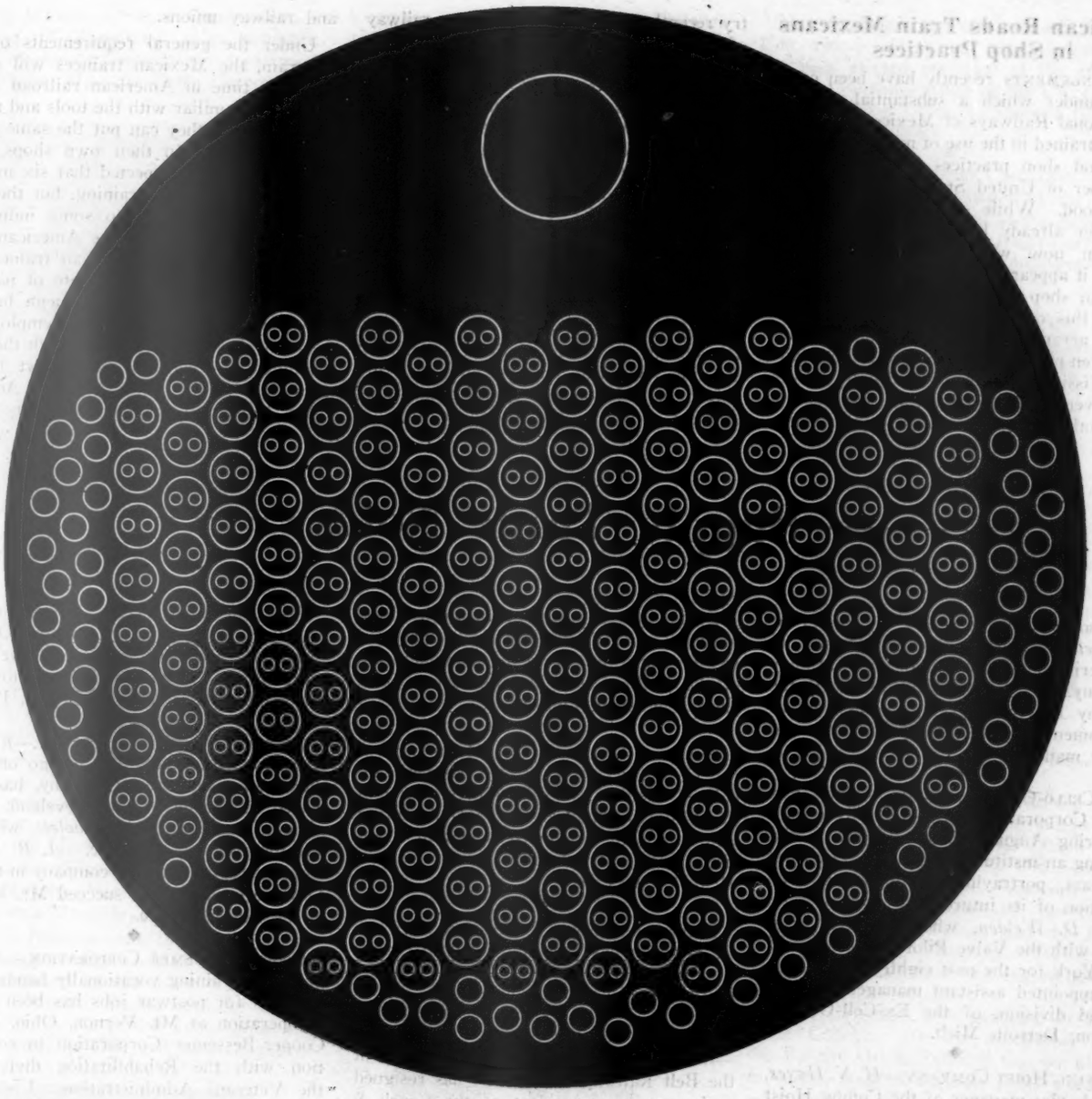

For *Maximum* Boiler Horsepower

Small flues with single loop superheater units provide the greatest evaporating and superheating surfaces, within a given diameter boiler.

Maximum boiler horsepower is essential to sustained and economical locomotive operation.

A-1635

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SUPERHEATERS • FEEDWATER HEATERS
AMERICAN THROTTLES • STEAM DRYERS
EXHAUST STEAM INJECTORS • FLOW METERS

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Montreal, Canada
THE SUPERHEATER COMPANY, LTD.

American Roads Train Mexicans in Shop Practices

ARRANGEMENTS recently have been completed under which a substantial number of National Railways of Mexico employees will be trained in the use of modern machine tools and shop practices in the shops of a number of United States railroads, it is understood. While some training of this character already has been going on, the program now will be considerably enlarged, it appears, so that as many as 1,000 Mexican shop workmen may be in training in this country at one time.

The arrangements for this undertaking have been pushed by the United States Railway Mission in Mexico, headed by Oliver M. Stevens, it is explained, and have developed both from studies made in this country recently by groups of Mexican railway officers of the methods and practices employed on American railroads and from the improvements in the shop equipment of the Mexican system which have been brought about through the efforts of the Mexican government to bring its railroad facilities up to the standards required to meet wartime demands.

The details of the program under which the training plan will be carried on have been made effective through the co-operation of the Inter-American Training Administration, the labor relations section, and the rail section of the Transportation Division of the Office of the Co-ordinator of Inter-American Affairs, and have involved the mission and the Mexican government as well as the American railroads and railway unions.

Under the general requirements of the program, the Mexican trainees will spend sufficient time in American railroad shops to become familiar with the tools and methods in use, so they can put the same practices into effect in their own shops. On the average, it is expected that six months will suffice for such training, but the program will be subject to some individual variations. In general, the American railroads will pay these Mexican trainees, as expense money, the going rate of pay for the job and place of employment, but the Mexicans will not acquire any employment relationship to the roads on which they are training, and will not be subject to the provisions of the Railway Labor Act and other legislation for employee benefit.

Supply Trade Notes

CARBOLOY COMPANY, INC. — *James R. Longwell* has been appointed director of engineering and research of the Carboloy Company. Mr. Longwell has been with the company 15 years, serving successively as development engineer, chief engineer, and factory manager.

◆

EX-CELL-O CORPORATION.—The Ex-Cell-O Corporation observed its Silver Jubilee during August. The company is distributing an institutional booklet, The First 25 Years, portraying its history and an indication of its future.

Fay D. Welden, who has been associated with the Valve Pilot Corporation of New York for the past eighteen years, has been appointed assistant manager of sales, railroad division, of the Ex-Cell-O Corporation, Detroit, Mich.

◆

COFFING HOIST COMPANY.—*H. N. Hayes,* general sales manager of the Coffing Hoist Company, Danville, Ill., resigned on July 1, 1944, to become associated with the *R. J. McQuade Company, Chicago.*

◆

HOUDAILLE-HERSHEY CORPORATION.—The Houdaille-Hershey Corporation has purchased all of the stock of the Honan-Crane Corporation, which will be operated as a subsidiary. The latter corporation manufactures oil purification equipment.

◆

PRECO, INC.—The *Pacific Railway Equipment Company* has changed its name to Preco, Inc. No change in the management or business of the company is involved.

◆

EDGEWATER STEEL COMPANY.—*D. W. McGeorge* has been elected vice-president and general sales manager of the Edgewater Steel Company.

◆

PHILCO CORPORATION.—*William E. Kress* has been appointed sales manager in the middle west for the Philco Corporation, with headquarters in Chicago, to succeed *John M. Otter,* who was appointed sales manager for the home radio division.

PHILIP CAREY MANUFACTURING COMPANY.—*C. B. Pooler* has been appointed vice-president in charge of manufacturing of the Philip Carey Manufacturing Company, Cincinnati, Ohio.

◆

PULLMAN-STANDARD CAR MANUFACTURING COMPANY.—*Mark Noble* has been appointed Pacific Coast sales representative of the Pullman-Standard Car Manufacturing Company with headquarters in San Francisco, Calif. Mr. Noble succeeds *Lathem McMullin,* deceased.

◆

FAIRBANKS, MORSE & COMPANY.—*Frank D. Ratcliffe* has been appointed in charge of a new office opened in Tulsa, Okla., by Fairbanks, Morse & Company.

◆

COACH & CAR EQUIPMENT CORPORATION. —*W. L. Fox,* general superintendent of the Belt Railway of Chicago, has resigned to become vice-president of the Coach & Car Equipment Corporation, Chicago.

◆

H. K. PORTER COMPANY.—The H. K. Porter Company of Pittsburgh, Pa., has purchased the Fort Pitt Steel Casting Company, McKeesport, Pa., manufacturers of pressure and alloy steel castings. The Fort Pitt Company will continue under the present management.

◆

BUSCH-SULZER BROS.-DIESEL ENGINE COMPANY.—*Morris H. Schwenk* has been elected president of Busch-Sulzer Bros.-Diesel Engine Company to succeed *Edward B. Pollister,* who has retired. *Mr. Schwenk* was an officer of the Baldwin Locomotive Works for many years and was formerly president of the De La Vergne Engine Company.

◆

CANADIAN LOCOMOTIVE COMPANY.—*Ralph Schmidt,* formerly chief, rail engineering, field service group under the office of the chief of transportation, U. S. War Department, has been appointed assistant chief mechanical engineer of the Canadian Locomotive Company.

WHITING CORPORATION.—The *Cardinal Supply & Manufacturing Company,* Omaha, Neb., has been appointed exclusive sales representative in the Omaha territory for the Whiting Corporation, Harvey, Ill.

◆

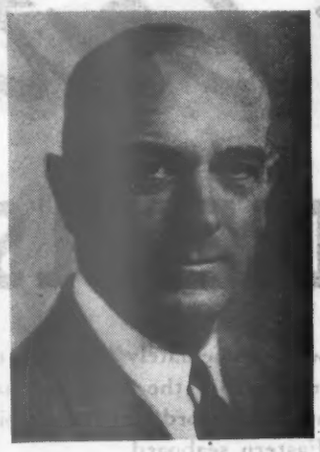
COPPERWELD STEEL COMPANY.—*Roy C. Raasch,* formerly of the Chicago office of the Copperweld Steel Company, has been placed in charge of the Cleveland, Ohio, office to succeed *E. N. Haslett,* who has left the company's service. *A. B. Leach,* who has represented the company in the St. Louis, Mo., area, will succeed Mr. Raasch in the Chicago office.

◆

COOPER-BESSEMER CORPORATION.—A program for training vocationally handicapped veterans for postwar jobs has been placed in operation at Mt. Vernon, Ohio, by the Cooper-Bessemer Corporation in cooperation with the Rehabilitation division of the Veterans Administration. Under the program, discharged soldiers with accredited aptitudes are given a four-year apprenticeship course of 8,232 hr. of shop work and 768 hr. of related classroom instruction under the supervision of instructors and an apprenticeship commitee consisting of three labor and three management representatives with the superintendent of schools of Mt. Vernon as an ex officio member. During the course, the veterans will receive standard apprentice pay from Cooper-Bessemer and in addition, a monthly maintenance allowance from the Government which will make the combined income the equivalent of a journeyman machinist's pay. As the veteran's apprenticeship pay rate advances, his allowance from the Government will decrease until he becomes entirely independent as a journeyman machinist.

Those completing the course will be given a "certificate of completion," indicating that they qualify as full-fledged machinists. According to a statement issued by the company, "It is also customary for Cooper-Bessemer to present each man with a $100 bonus and to give him a job at journeyman's wages."

JOHNS-MANVILLE SALES CORPORATION.—*Raymond P. Townsend,* sales manager, eastern region, transportation department the Johns-Manville Sales Corporation,



Raymond P. Townsend

has been appointed general sales manager of the transportation department throughout the United States and Canada with headquarters at New York. *John D. Johnson,* divisional sales manager of the transportation department, eastern division, has been appointed sales manager, eastern region, transportation department, also with headquarters at New York.

Raymond P. Townsend began his career in the purchasing department of the New York Central, later serving as purchasing agent of the Liberty Steel Products Company and as railroad sales representative of the Murphy Varnish Company. He joined Johns-Manville in March, 1925.

John D. Johnson from 1907 to 1919 was in railroad servicing work in the mechanical departments of the New York Central, the Missouri Pacific and the Baltimore & Ohio. He joined Johns-Manville as a salesman in 1920 and was appointed

John D. Johnson

division sales manager of the central division at Cleveland, Ohio, in 1930. He became acting sales manager of the eastern division at New York in 1943.

◆

MIDVALE COMPANY.—*Thomas Rutherford* has been appointed manager of railroad and casting sales for the Midvale Company with headquarters in Philadelphia, Pa., and *Truxton R. Brodhead* has been appointed Philadelphia district sales manager. *Howard M. Givens, Jr.,* has been appointed manager of bar steel sales, with headquarters in Philadelphia.

◆

WESTINGHOUSE ELECTRIC & MANUFACTURING COMPANY.—*W. F. Boyle* has been appointed manager of gas-turbine activities at the Steam Division of the Westinghouse Electric & Manufacturing Company, Philadelphia, Pa. Mr. Boyle, who is a graduate of Pratt Institute, has been with the Steam Division and the Middle Atlantic sales district of the Westinghouse Company since 1927 when he completed the company's graduate student training course at East Pittsburgh. Prior to his new assignment he was manager of the Marine Section of the Steam Division Application Department and before that was manager of the Division's sub-contracting department.

◆

DEARBORN CHEMICAL COMPANY.—*H. G. Mastin,* service engineer of the Dearborn Chemical Company, has been appointed district sales manager of the Eastern district of the Railroad department of the Dearborn Chemical Company, Chicago, with headquarters at New York. Mr. Mastin entered railway service with the New York, Ontario & Western where, during 11 years,

H. G. Mastin

he advanced from locomotive fireman to traveling fireman and to assistant road foreman of engines. He was then employed by the Locomotive Stoker Company—six years as service engineer and four years as sales representative. For the next 5½ years he was in the railroad and marine departments of the Pantasote Company and during the next six years was a sales representative in the Locomotive Equipment division of Manning, Maxwell & Moore. On April 15, 1942, he became service engineer of the Dearborn Chemical Company.

◆

JONES & LAUGHLIN STEEL CORPORATION.—*Adam J. Haslett,* general manager of sales, has been elected vice-president in charge of sales of the Jones & Laughlin Steel Corporation, to succeed *Lewis M. Parsons,* who has resigned. *L. T. Willison* has been appointed manager of cold finished sales in addition to his duties as manager of ordnance sales.

HAYNES-STELLITE COMPANY.—*E. E. LeVan,* vice-president and general manager, has been elected president of the Haynes Stellite Company, a unit of the Union Carbide & Carbon Corp., to succeed the late *Francis P. Gormely.*

◆

AMERICAN LOCOMOTIVE COMPANY.—*Hunter Michaels,* sales manager of the Railway Steel Spring Division of the American Locomotive Company, and *Hugh Corrough,* division manager of Alco products, have

Hunter Michaels

been appointed directors of their respective divisions of the company.

Hunter Michaels has been with the company since 1927. Prior to that time he was connected with the National Dump Car Company, the American Car and Foundry Company, the Hart-Otis Company, the Rodger Ballast Car Company, the Union Metal Products Company, and the Railway Steel-Spring Company. He served as a 1st lieutenant with the engineers during the first world war.

Hugh Corrough is a graduate of Iowa State College. He was associated with the Empire Oil & Refining Co. in various capacities from 1923 until 1934, when he was appointed to an executive position with

Hugh Corrough

the Cities Service Oil Company. He joined the Alco products division of the American Locomotive Company in June, 1936, and served as chief mechanical engineer, assistant manager of engineering, manager of engineering, and manager of the Alco products division.

(*Turn to second left-hand page*)

Breaking Critical

with GM FREIGHT DIESELS

THE Southern Railway, one of the nation's great railway systems, continues to haul tremendous volumes of vital war materials from the south and southwestern sections of the country. Daily movements of oil became so staggering, almost overnight, that the movement of oil was soon the No. 1 war job of the Southern. Immediately upon delivery of the first of its fleet of eight 5400 Hp. General Motors Diesel freight locomotives, it was assigned to handling symbol oil trains through a section of the line that had been a "bottleneck." As other GM Diesels were delivered, they were immediately assigned to this service with the result that the Southern has established a very enviable record for the rapid delivery of oil to the Eastern seaboard.

In passenger service, a fleet of eleven General Motors Diesel locomotive units, with over 5,000,000 miles of operation, has established the remarkable availability record of 96 percent and a high on-time record despite the severity of the service. General Motors Diesel switchers round out the Southern's rapidly growing Triple-Diesel Service.

ELECTRO-MOTIVE DIVISION

GENERAL MOTORS CORPORATION — LA GRANGE, ILLINOIS, U. S. A.

GRAYBAR ELECTRIC COMPANY.—*George J. Cossmann,* formerly assistant central district manager, has been appointed central district manager of the Graybar Electric Company to succeed *Walter P. Hoagland,* vice-president, who retired June 1 after 44 years of service.

◆

GENERAL MOTORS CORPORATION, ELECTRO-MOTIVE DIVISION.—The Electro-Motive Division of General Motors Corporation will construct new facilities for the manufacture of spare parts. One building will house service repair and parts and will include modern facilities for the complete rebuilding of locomotives and all of their subassemblies, as well as production and storage of spare parts. The other will house the transmission division machine shop, locker room, cafeteria and receiving inspection and warehouse.

◆

MORRISON METALWELD PROCESS, INC.—*George J. Diver* has been appointed vice-president of Morrison Metalweld Process, Inc., subsidiary of the Morrison Railway Supply Corporation. Mr. Diver began his career in the superintendent's office of the Peoria & Eastern in 1900. He subsequently was in the service of the Big Four and the Lake Erie & Western, where he was freight claim investigator. He joined the Interstate Car Company of Indianapolis, Ind., in 1905 and served as general manager from 1919 to 1924. When the Interstate Car & Foundry Company was organized in 1925, he was elected president and general manager. Mr. Diver

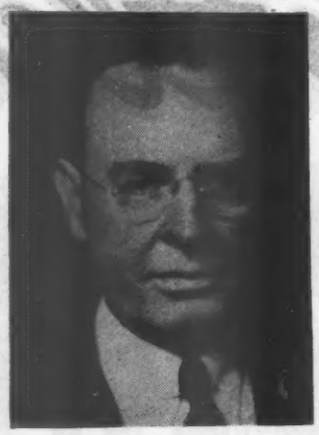
George J. Diver

joined Morrison Metalweld Process in 1929, handling sales and operations in the western district. He was transferred to a similar position at Buffalo, N. Y., in April, 1941.

◆

UNION SWITCH & SIGNAL COMPANY.—*Harold S. Loomis,* formerly assistant general manager, has been elected vice-president in charge of engineering of the Union Switch & Signal Company, and *Leonard C. Ritterbush,* formerly general sales manager, has been elected vice-president in charge of sales. *Richard H. Wood* has been appointed assistant general manager.

Harold S. Loomis entered railway service in the motive-power department of the Pennsylvania in 1904. He was granted furloughs at various times to complete his regular school work and is a graduate of the school of electrical engineering, Purdue University (1909). He returned to the Pennsylvania as an apprentice in the sig-



Harold S. Loomis

nal department and was appointed assistant signal inspector with headquarters in Philadelphia, Pa., in 1912. Later that year he was appointed assistant supervisor of signals on the West Jersey & Seashore and,

Richard H. Wood

in 1913, became assistant supervisor of signals of the Philadelphia division of the Pennsylvania. He joined the engineering department of the United Switch & Signal Company in 1914; was appointed in charge of the company's commercial engineering department in 1916; assistant to the general manager in 1929, and assistant general manager in 1936.

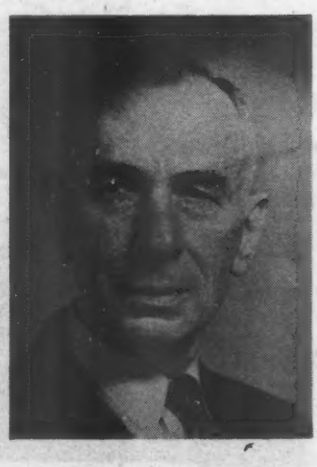
Leonard C. Ritterbush joined the company in 1924 as a member of the commercial engineering department. He was appointed New York district engineer in 1930, a sales representative of the company in 1932 and assistant district manager at New York in 1937. He returned to Swissvale, Pa., as general sales manager in 1940. Mr. Wood is a graduate of the electrical engineering school of Ohio State University and the

Leonard C. Ritterbush

Duquesne University Law School. He joined the Union Switch & Signal Company as a member of the engineering department in 1922 and later worked in the company's patent department. He was appointed patent attorney in 1936 and assistant to the general manager in 1943.

◆

WAUGH EQUIPMENT COMPANY.—*R. G. Kelley* has been appointed assistant to the president of the Waugh Equipment Company. Mr. Kelley is a graduate of Michigan University (1908) with a degree in me-



R. G. Kelley

chanical engineering. He began his career with the New York Central and was motive power inspector of that road from 1911 to 1916. He was service engineer and district engineer of the Locomotive Stoker Company for the following 12 years and service representative of the Worthington Pump & Machinery Corporation for two years. In 1930 he was appointed service engineer of the Firebar Corporation, which was merged with the Waugh Equipment Company in 1932.

Army-Navy "E" Awards

Clark Equipment Company, Tructractor division, Battle Creek, Mich. Third award.

Cochrane Corporation, Philadelphia, Pa. Renewal.

Handy & Harman, New York. Fifth award.

Heywood-Wakefield Company, Gardner, Mass. Third award.

Independent Pneumatic Tool Company, Aurora, Ill. Third award.

Standard Stoker Company, Erie, Pa.

BETHLEHEM STEEL COMPANY.—*H. H. Fuller,* New York district sales manager, has been elected vice-president in charge of west coast steel activities of the Bethlehem Steel Company to succeed *W. H. Stewart,* who is retiring from active duty but will continue in an advisory and consulting capacity. *C. M. Mackall,* general manager, central sales at Pittsburgh, Pa., will succeed Mr. Fuller as manager of sales, New York district, and *Bennett C. Macgregor,* formerly manager of sales, St. Louis, Mo., district, will succeed Mr. Mackall as general manager, central sales. *C. H. Cecil,* a member of the sales force in the Chicago district, has been appointed manager of sales at St. Louis.

Obituary

GEORGE C. PURDY, chairman of the board of Greenlee Bros. & Co., Rockford, Ill., died on July 2.

ARGYLE CAMPBELL, president of the Enterprise Railway Equipment Company, Chicago, died at San Clemente, Calif., on August 12.

◆

EDMUND H. LUNKEN, chairman of the board of the Lunkenheimer Company, Cincinnati, Ohio, died July 19. Mr. Lunken, who was 83 years of age, was the son of Frederick Lunkenheimer, who founded the Lunkenheimer Company in 1862. He entered the business at the age of 16 and assumed leadership of the company upon the death of his father in 1889.

◆

LATHEM MCMULLIN, west coast representative of the Pullman-Standard Car Manufacturing Company, the Baldwin Locomotive Works and the Woodings-Verona Tool Works, with headquarters in San Francisco, Calif., died in that city on June 29.

J. A. SCHERMERHORN, works manager of the American Welding Company, Carbondale, Pa., subsidiary of the American Car and Foundry Co., died August 3. He was 37 years of age.

◆

PAUL CLIFFORD CADY, president of Paul C. Cady, Inc., a sales agency for railway and industrial supplies, died August 5. Mr. Cady was 67 years of age. He was born in Cleveland, Ohio, and received his education in Cleveland schools and at the Baldwin University Law School. He began his railroad career in the mechanical department of the Lake Shore & Michigan Southern in Cleveland and later was employed in the mechanical department of the New York Central at New York. He resigned as assistant to the chief mechanical engineer of the New York Central in 1919 to enter the railway supply business.

Personal Mention

General

A. R. DAVIS, who has been appointed superintendent fuel conservation and lubrication of the Missouri Pacific at St. Louis, Mo., as noted in the July issue, was born on February 6, 1895, at Golden, Mo. He attended school at Golden and in July, 1918, entered the employ of the Kansas City Southern as a fireman at Pittsburg, Kan. In 1919 he became fireman, and was later promoted to engineman, of the Miami Belt. He entered the service of the Missouri Pacific on February 24, 1920, as a locomotive fireman, Omaha division. In 1936 he became engineman; in July, 1938, road foreman of engines, Missouri and Memphis division, with headquarters at Popular Bluff, Mo.; in 1939 was transferred to the Central Kansas and Colorado division, with headquarters at Osawatomie, Kan.; in 1941 was transferred to the Little Rock-Louisiana division, and in November, 1942, as road foreman of engines to the Omaha division, with headquarters at Falls City, Neb. In March, 1944, he was appointed system road foreman engines, with headquarters at St. Louis, Mo., and in June became superintendent of fuel conservation and lubrication at St. Louis.

A. R. Davis

CLEMENT O. JOHNSON, who has been appointed assistant mechanical engineer of the Central of Georgia at Savannah, Ga., as noted in the August issue, was born on August 21, 1901, at Savannah. He is a graduate of the Georgia School of Technology (1926) where he received the degree of B.S. in mechanical engineering. He became cooperative apprentice in the shops of the Central of Georgia in July, 1923; assistant chemist in 1926, and chemist in 1935. He was called into the United States Army as captain, Ordnance Department, in 1941 and was promoted to major of that department in February, 1942. Mr. Johnson was released from the army in January, 1944, and was appointed assistant mechanical engineer of the Central of Georgia in June, 1944. While in the army, he organized and operated a special machinists' school for enlisted men at the Ordnance Replacement Training Center, Aberdeen Proving Ground (1941-43). He then organized and operated automotive, tank and gun shops at Camp Hood, Tex.

C. O. Johnson

SAMUEL D. DEKLE, who has been appointed assistant general superintendent of motive power of the Seaboard Air Line, with headquarters at Norfolk, Va., as announced in the August issue, was born at Waycross, Ga., on February 22, 1892. On June 15, 1907, he entered railroad service with the Atlantic Coast Line as a machinist apprentice. Thereafter he served successively as machinist, machine-shop foreman, enginehouse foreman, and general foreman. In 1920 Mr. Dekle became supervisor, C. & A. and Copper Queen copper mines, and in 1922 became enginehouse foreman of the Seaboard Air Line serving successively at Waldo, Fla., and Wildwood. He became general foreman at Wildwood in 1925, general foreman and acting master mechanic at Atlanta, Ga., in 1929; shop superintendent in 1937, and assistant to general superintendent of motive power in 1942.

Samuel D. Dekle

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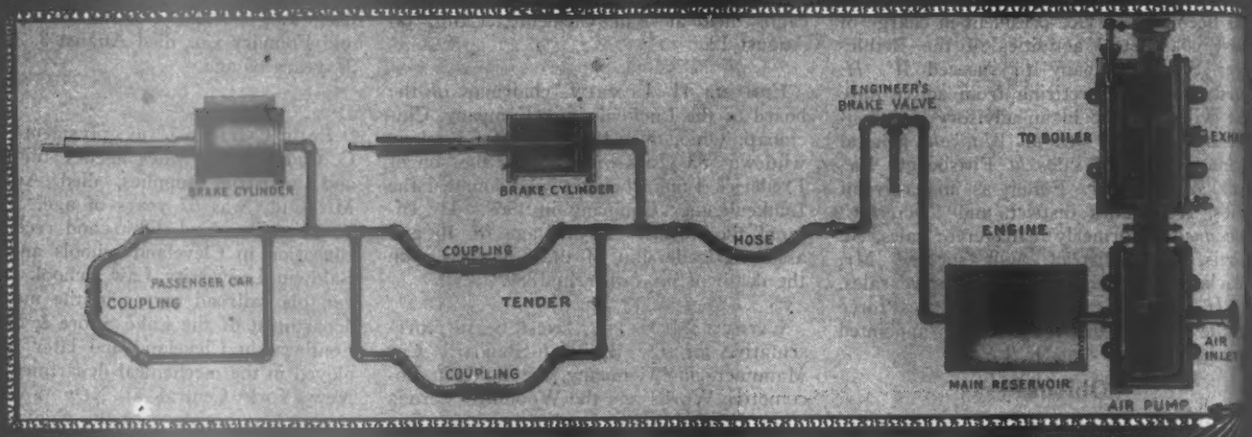
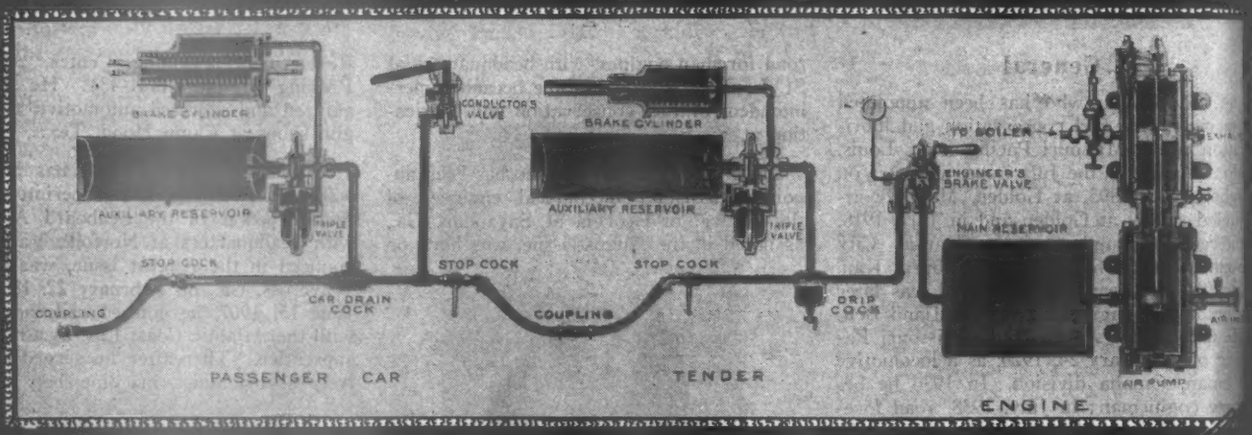
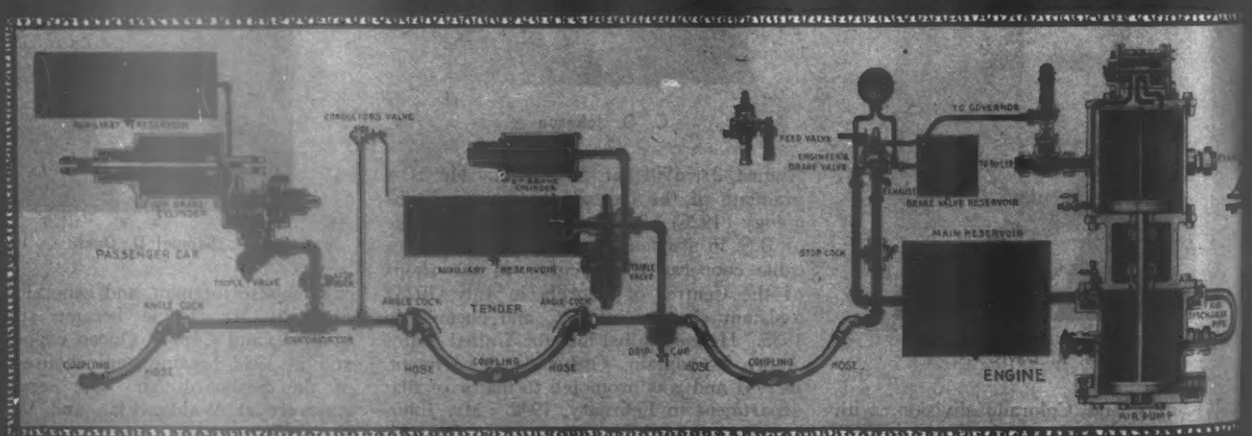


The Westinghouse Original Straight Air Brake 1869



The Westinghouse Plain Automatic Air Brake 1872



The Westinghouse Quick-Action Automatic Air Brake 1887

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Master Mechanics and Road Foremen

W. SHARP has retired as division master mechanic of the Southern Ontario district, Canadian National.

V. E. MORTON has been appointed division master mechanic of the Southern Ontario district, Canadian National.

J. M. JEFFREY, general enginehouse foreman of the Illinois Central at Chicago, has been appointed assistant master mechanic, with headquarters at Markham (Chicago).

R. W. ELLIS, assistant master mechanic of the Illinois Central at Markham (Chicago), Ill., has been promoted to master mechanic, with headquarters at Memphis, Tenn.

Q. BOYD, master mechanic of the Capreol division of the Canadian National at Capreol, Ont., has been transferred to the Allandale division, with headquarters at Allandale, Ont.

H. C. SWANSON, who has been appointed master mechanic of the Southern at Spencer, N. C., as announced in the August issue, was born on December 17, 1891, at Birmingham, Ala. He finished the seventh grade in common school and in 1918 completed an International Correspondence School course in mathematics and mechanical drawing. He entered the employ of the Southern on July 15, 1905, as a call boy, later serving as hostler helper, machinist apprentice, and machinist at Birmingham, Ala. He became foreman at Selma, Ala., in 1915; assistant general foreman, Birmingham, in March, 1923; general foreman at Birmingham on October 1, 1924; shop superintendent at Spencer, N. C., on May 1, 1932; master mechanic at Lawrenceville, Va., on May 15, 1934; master mechanic at Columbia, S. C., on October 1, 1934; assistant master mechanic at Spencer on November 9, 1936, and master mechanic on July 1, 1944.

Car Department

M. W. SUTTON has been appointed general car foreman, British Columbia district, of the Canadian National, with headquarters at Vancouver, B. C.

N. H. CRAIG, supervisor car department of the Toronto, Hamilton & Buffalo, has had his title changed to superintendent car department.

E. C. ELLIS, whose appointment as superintendent car department of the Chesapeake & Ohio, with headquarters at Richmond, Va., as announced in the August issue, was born at Huntington, W. Va. He studied at the Virginia Mechanics Institute and entered Chesapeake & Ohio service at Huntington in 1909 as a carman apprentice. He became coach carpenter in 1914; was transferred in 1921 to the motive power department at Richmond, and became general passenger car inspector in 1924. In 1934 he was appointed supervisor passenger car maintenance and inspection at Huntington, and in 1936 was transferred to the position of supervisor passenger-car maintenance and inspection at Richmond. He continued at Richmond until his appointment as superintendent car department.

Shop and Enginehouse

A. P. BLAIKIE has been appointed locomotive foreman at the Port Mann shops, British Columbia district, of the Canadian National.

S. C. MAY has been appointed chief boiler inspector, western region, of the Canadian National, with headquarters at Winnipeg, Man.

JOHN T. WESCHROB has been appointed general foreman at the Southampton street enginehouse of the New York, New Haven & Hartford, at Boston, Mass.

E. V. MYERS, assistant general foreman, locomotive department, of the St. Louis Southwestern of Texas at Tyler, Tex., has been promoted to the position of general foreman.

C. G. HORSMAN, mechanical inspector of the Canadian National at Moncton, N. B., has been promoted to the position of night locomotive foreman at Campbellton, N. B.

T. W. BELLHOUSE, mechanical inspector of the St. Louis Southwestern at Tyler, Tex., has been promoted to the position of assistant general foreman, locomotive department.

WILLIAM M. J. MACDONALD has been promoted to the position of assistant general foreman at the Southampton street enginehouse of the New York, New Haven & Hartford at Boston, Mass.

Obituary

DENNISTOUN WOOD, engineer of tests of the Southern Pacific, with headquarters at San Francisco, Calif., died at his home in Palo Alto, Calif., on July 12, following a heart attack.

EUGENE H. ROY, general superintendent of motive power of the Seaboard Air Line at Norfolk, Va., died on June 17. Mr. Roy was born on August 14, 1883, at Winooski, Vt. He entered railway service with the Boston & Maine as a machinist in 1905, later serving as a machinist in the employ of the Florida & East Coast. Mr. Roy then joined the Seaboard Air Line, serving successively as machinist, enginehouse foreman, general foreman, master mechanic, general master mechanic, and assistant general superintendent of motive power, until May 18, 1936, when he became general superintendent of motive power of the Seaboard Air Line at Norfolk.

C. L. MEISTER, mechanical engineer of the Atlantic Coast Line, died at Wilmington, N. C., on August 14. Mr. Meister, who was born at Brooklyn, N. Y., on June 22, 1876, was a graduate of Stevens Institute of Technology in 1897, with the degree of mechanical engineer. He entered railroading with the Erie in November of that year, and after serving as special apprentice and draftsman, he became a draftsman in the employ of the New York Central & Hudson River in November, 1901. In August, 1902, Mr. Meister went with the Atlantic Coast Line as chief draftsman, becoming mechanical engineer in March, 1906.

Trade Publications

Copies of trade publications describe in the column can be obtained by writing to the manufacturers, preferably on company letterhead, giving title. State the name and number of the bulletin or catalog desired, when it is mentioned.

MILLING CUTTERS.—The Ingersoll Milling Machine Company, Rockford, Ill. Chart, 15-in. by 23-in., illustrating basic grinds for milling cutters for use on different types of material. Suitable for mounting.

◆

SELENIUM RECTIFIERS.—Fansteel Metallurgical Corporation, North Chicago, Ill. Twelve-page booklet containing technical information, specifications, illustrations, wiring diagrams, catalog listings and ordering references on more than 130 standard Selenium rectifiers.

◆

LOW TEMPERATURE WELDING.—Eutectic Welding Alloys Company, 40 Worth street, New York. Four-page folder, "The Theory of Soldering, Brazing and Low Temperature Welding," tells how the Eutectic process was discovered and explains what happens when the Eutectic welding alloy is deposited on the parent metal at low temperatures.

◆

CABLE VULCANIZER.—Mines Equipment Company, St. Louis, Mo. Twelve-page bulletin, RV-104, describes vulcanizers for making a variety of repair and junction splices on rubber cable; also pothead molds used with the same vulcanizers for making cable terminals.

◆

ELASTIC STOP NUTS.—Elastic Stop Nut Corporation of America, Union, N. J. Catalog and data book on self-locking nuts. Covers the hex, anchor, and clinch types of nuts, and illustrates their use in the solution of difficult fastening problems.

◆

GEAR REDUCTION UNIT. — Cleveland Worm & Gear Company, Cleveland, Ohio. Catalog, No. 300, Speedaire fan-cooled worm-gear reduction units. Details of Speedaire principle shown in Cutaway illustrations, charts, diagrams, and engineering tables.

◆

METAL-CUTTING SAW.—Peerless Machine Company, Racine, Wis. Twelve-page Bulletin HC-50. Describes Hydra-Cut metal-cutting power saw, with detailed specifications for 7-in., 11-in., and 14-in. sizes. Data also included on manual and automatic conveyors for use with Hydra-Cut machines.

◆

STAINLESS-STEEL SHEETS. — American Rolling Mill Company, Middletown, Ohio. Forty-page handbook of Design Data on Stainless Steel Sheets for Structural Purposes. Gives mechanical properties of the stainless steels and derived design data, some fundamental concepts of design theory to be considered when using stainless steel at the high stresses where they are most effective; stress-strain data from tension and compressive tests on high strength stainless-steel sheets, etc.

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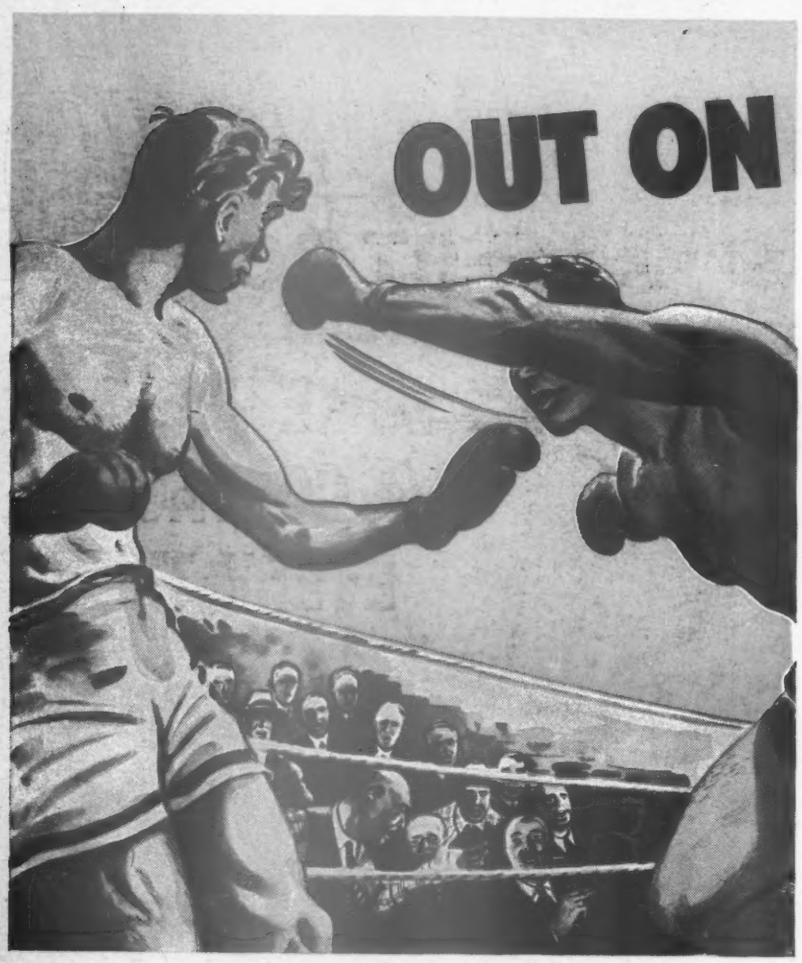

OUT ON HIS FEET

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Its percentage of scrap runs pretty high; time has to be taken out for frequent readjustments; the operations it can do are limited; it is hard to operate; its undependable performance plays the devil with fine tolerances and drives the blameless operator almost to distraction. It's a mechanical "slow down striker" on your production line. You're money ahead to toss in the towel and get a brand new lathe.

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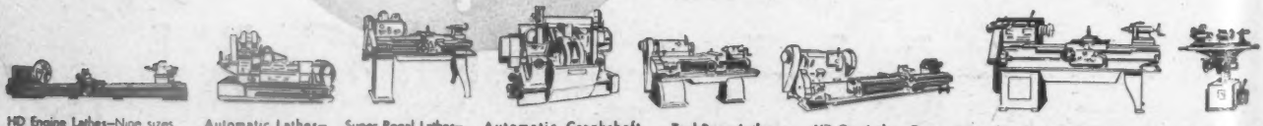

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Automatic Lathes—12" & 16". Mechanical or Hydraulic power.

Super Regal Lathes—Six sizes, 13" to 24". Best for training.

Automatic Crankshaft Lathes—For all facing, turning, finishing, pins.

Tool Room Lathes—12", 14", 16" and 18" swings. Versatile.

HD Gap Lathes—Ten sizes in Regular and Sliding Gap models.

Rapid Production Lathes—13", 17", 20" swings. Six speeds. Faster output. Lower cost.

No. 2 Cutter Grinder—Internal, cylindrical, face and angular work.

LARGEST MANUFACTURER OF A COMPLETE LINE OF LATHES